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Monitoring Times

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Cover Story

Radio Propagation and the Sun

By Ian Poole

One cannot understand the behavior of radio waves and how they travel (propagate) without studying the various relationships between the Earth and the Sun. Ian Poole begins with an examination of the layers within Earth's atmosphere and their effects on radio waves. Then he describes how events and cycles within the Sun itself can affect these atmospheric layers, and how you can use this information for more effective radio operations.

Accompanying the article are several sidebars. It has long been thought that solar flares were a major cause of disruptions in radiocommunications. However, research by J.T. Gosling is pointing to a different source: coronal mass ejections.

Another theory which is being overturned is the source of the radiation belts which encircle the Earth and affect the operation of satellites. In this case, the Earth itself may be the energizer, not the Sun.

Did you know the Earth is losing its ionosphere at the poles? The solar wind can act like a shock wave, in which some ions escape Earth's gravity, though most of it returns to the Earth. The conclusion: "Earth's own ionosphere is a major contributor to the growth of (damaging) space storms."

Cover photo, copyright WeatherStock.

C O N T E N T S

How to Identify FM Skip 14

By John Mayson

One of the unpredictable characteristics of "space weather" is known as "skip" — when radio signals that should be confined to local propagation suddenly get ducted to an entirely different part of the country. When this happens to local two-way communications on VHF low band, it's unquestionably exciting. But how can you find out who it was you heard and whether your reception was from 300 or merely 30 miles away?



Radio Australia Looks to the Future 18

By John Figliozi



Last month John Figliozi covered the climate of change facing international broadcasters. This month he looks at Radio Australia — one of the most dramatic examples of a broadcast service plummeting from international success to near decimation — in an interview with network manager Jean-Gabriel Manguy. RA's turn-around may prove instructional for services facing similar obstacles.

Reviews:



Want a tiny two-way radio that's big on performance? The **Cherokee FR-460** is the leader in the "smaller and cuter" category (see p. 87). Not to be left behind, Grundig has designed an elegant shortwave radio in a wallet — the **G4 Executive Traveller**, "bringing shortwave

out of the closet and onto the fashion runway" (p. 90). Radio Shack's new **PRO-2066** scanner can be recommended for mobile use in areas with trunked systems (p.92). On mediumwave, Crane Co. and Sangean have collaborated to produce a set specifically designed to receive the spoken word — the **CCR radio** (p.96). Other reviews: the **Grove FCC Database V6.2** (p.94) and satellite accessories (p.66).





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WASHINGTON WHISPERS

By Fred Maia, W5YI
fmaia@cwixmail.com

• **The FCC has ruled that apartment dwellers can not be prevented from installing and using outside television antennas.** The government adopted rules on November 20th which permit tenants in rental properties such as apartments and single family homes to install TV antennas, small dishes and wireless cable antennas in areas that they control such as balconies and patios. The amendment is aimed at serving the federal objectives of promoting competition among multichannel video providers and giving viewers access to multiple choices to obtain video programming.

Eight million people now receive direct broadcast satellite television signals on small pizza-pan-sized dishes and some landlords frown on outside antennas, especially if the unit is already equipped with cable TV. The FCC is trying to make satellite TV companies stronger competitors, especially since cable TV rates will be deregulated in March.

Consumer groups, satellite TV companies, broadcasters and consumer electronics makers asked the FCC to give renters the right to install TV antennas. On the other hand, associations representing apartment owners, home builders and real estate managers argued that such rules permitted unsightly antennas and interfered with property owners' rights and lease terms. Lawsuits to challenge the decision appear likely.

The FCC's action responds to the 1996 telecom law that gave the Commission authority to end restrictions which prevent viewers from receiving various video technologies. The rules which take effect around the first of the year will supersede any existing leasing agreements that restrict tenants from installing dishes or other TV antennas.

Unfortunately, the new rules only apply to television antennas and not ham radio. Amateur radio operators have long fought for their right to install outside transmitting antennas and communications towers in residential areas, many of which have zoning and deed restrictions.

• **New WTB Bureau chief named** — Dan Phythyon, who headed the FCC's Wireless Telecommunications Bureau, left his post on December 1 ending a four-year tenure that saw him occupy the top position for more than 18 months.

FCC Chairman William E. Kennard named Thomas J. Sugrue to replace Phythyon. Sugrue's background includes a six year stint as Deputy Assistant Secretary of Commerce at the NTIA (National Telecommunications and Information Administration) where he advised

the White House on communications policy issues. He also served four years with the FCC's Common Carrier Bureau. Mr. Sugrue holds J.D. and Public Policy degrees from Harvard, and a B.S. in physics from Boston College.

The Wireless Telecommunication Bureau oversees all non-broadcasting and common carrier radio services including CB radio, the General Mobile Radio Service and Amateur Radio.

• **Free Radio Berkeley becomes Tree Radio Berkeley!** The pirate station which was ordered closed down last June 16th by U.S. District Judge Claudia Wilken began operating from a California redwood at a height of 50 feet!

Powered by car batteries, their unlicensed 40-watt microstation operated on the FM broadcast dial at 104.1 twenty-four hours a day from a wooden platform covered by a blue tarp canopy. Warnings by the FCC of arrests and equipment seizure were been ignored by the station operators.

Apparently the pirate station had the backing of the local city government. According to the *San Francisco Chronicle*, the Berkeley City Council voted unanimously to express "moral support" for the station and "disappointment" with the judge's action.

The tall redwood is located in a public park, but the Berkeley police did not enforce its curfew. The two lofty operators, who call themselves "Birdman" and "Sparrow," came down voluntarily after a few days of operation, saying they had made their point and did not want to get city officials in trouble.

Steve Dunifer of Free Radio Berkeley fame said that he is not involved with the station. But he did hold a press conference at the site where he estimated that there are about 1,000 small, illegal radio stations operating nationwide. The FCC said the number was closer to 100.

• **Sony Electronics has recalled 60,000 dual-band (800-MHz and 1.9 GHz) analog/digital cellular phones** that have the capability to exceed the maximum allowable radio frequency (RF) power output when operated in the analog mode. While the phones would have improved performance, they also might endanger the health of users, an FCC official suggested.

The government adopted more stringent guidelines for human exposure to RF from handheld devices in August 1996. Sony said that the excessive power output was unintentional — that engineers misinterpreted the

FCC's specification for maximum allowable power output.

• **The space shuttle that launched John Glenn also launched live coverage by a High-Definition TV news crew.** The HDTV feed was relayed through satellites for nationwide coverage. Most viewers saw the HDTV launch in dedicated viewing areas in Houston, Chicago and Washington, DC. Even with the Christmas rush, fewer than 10,000 HDTV receivers are expected to be sold in the U.S. during 1998.

And a DVD that contains President Clinton's grand jury testimony is now available. Media Galleries, a California-based DVD publisher, says this is the first DVD of a historical event.

• **The future of high definition television (HDTV) depends upon who you are talking to.** Saying HDTV will fail, Forrester Research Inc. contends that SDTV (standard definition television) delivers the same benefits as HDTV, but without the high-definition picture and high price.

SDTV uses a digital "progressive scanning" technology similar to that found in computer monitors to produce a picture that's sharper than today's analog (NTSC) television that uses "interlaced scanning." At 20 feet away, a 30- or 40-inch SDTV or HDTV are hard to tell apart.

Today's first-generation HDTV costs \$5,000 to \$10,000 each. Over time, prices will drop. But Forrester predicts that HDTV sets will still cost at least \$2,000 ten years from now — twice that of SDTV. The report forecasts that only a million HDTV sets will be sold between now and the year 2003 and concludes that TV makers should concentrate on less sophisticated SDTV sets.

By sharp contrast, the Consumer Electronics Manufacturers Association (CEMA) says their research shows that 150,000 HDTV sets will be sold by the end of 1999; 600,000 in the year 2000 and that the first 10 million sets will be sold by 2003, the next 10 million in 2004 and 2005, and 10.8 million to be sold in 2006.

Broadcasters have already begun airing some programming in digital form, but there are few sets in the hands of consumers to watch the programming. By the year 2006, all TV stations in the United States must switch to digital broadcasting entirely. At that time, their analog TV channel is to be returned to the FCC for auctioning where it is expected to bring billions to the U.S. treasury.

The Edington Family Ark

Well, everyone had fun with the "56,000-foot yacht" the Edington family was supposedly building in their backyard in England (see December "Communications"). My own husband was the first to point out the error, and the next morning came a phone call from William Yeates of the Georgia Radio Reading Service, followed by a letter from Harry Church of Lebanon, Illinois, who said, "I'd certainly like to have a gander at any ship that runs some ten miles along its length!"

Obviously the yacht measured a much more reasonable 56 feet! My technical editor claims this copy never came across his desk. (Yeah, right, Larry.) Oh well, guess I can't share the blame ... hope you enjoyed the chuckle ...

— Rachel Baughn, editor

Ernest Bagley's monitoring post in South Portland, Maine.



Great, Low-priced SW Kit

"I built the TenTec 1254 kit (see Sept. 98 MT) and it is, I think, exceptional. I made an amplified antenna for it and I pack all in a small cigar box and take it lots of places. I don't know whether you care about kits, but that one is a breeze to build and a joy to use. The secret is that they designed it to use two 9-volt batteries so that it remains very steady. Of course, when you buy the "box" to go with it you have passed the cost of a Radio Shack \$39 shortwave receiver, but I still think it is a good deal.

— Robert B. Foster

Baltimore Maritime

"I wanted to thank you for your outstanding maritime coverage in the June 1998 issue of *Monitoring Times*. I especially enjoyed the article titled "Maritime Monitoring on the Chesapeake" by Ronald A. Perron. To you and Mr. Perron I say "Bravo!" Keep up the good work.

"For me it's always great to see articles like this. I am always seeking information relating to "anything maritime." Although I now reside in Pennsylvania I was born and raised in Baltimore. As a very young man my love for radio began when an uncle gave me a Hallicrafters S40-A receiver. Not long after I discovered that it was very possible for me to monitor the activity on the bay with this rig. I can't begin to tell you how many hours were spent listening to the AM marine channels of 2182, 2638 and 2738 through all of the static

crashes. With this began a love affair that continues until today. The old Hallicrafters is long gone but the memories remain as though it were yesterday.

"I still travel to Baltimore to visit family and friends and never fail to take along a radio to keep up with the marine activity. This article has given me even more information to use in my travels. Once again MT came through with outstanding coverage."

— Al Bauernschmidt, N3KPJ

Emergency Service by Phone?

"I just read your interesting July editorial [on storm tracking]. It seems inconceivable that in the 'information age,' real-time emergency information is almost non-existent. The technology is in place. What we lack is a sense of priority. After I saw the tornado destruction in Dunwoody (outside Atlanta, GA) last April, I wondered what it will take. What we need is:

1. Serious government commitment, either to provide an effective fast warning system or to encourage (or force) commercial industry to provide it.
2. A similar commitment in the communications industry to provide the service, either as a public service with possible government subsidy or on a demand/profit basis.
3. Public education. This could create the demand that industry needs.

I think the obvious solution is not a broadcast signal; it reaches too few. But most homes do have a telephone line. This could be

the conduit to carry a specially coded ring signal, or a modulated sub-carrier to trigger an external decoder, to sound a take-cover alarm. There are drawbacks with this, too, but it is in place now!

— John Coker, Dunwoody

I like the idea of the telephone notification system. Problem is, by using this common carrier system for such a notification on a broadcast basis, who would pay the tariffs? It is worth considering, however, and anyone making the interfaces could make a bundle. Hmmm ... might be worth petitioning for!

— Bob Grove

Student Scholarship

The Dayton Amateur Radio Association (DARA) is accepting applications for their annual scholarship awards, open to any FCC licensed amateur radio operator graduating from high school in 1999. The scholarship can be awarded toward attendance at any accredited institution.

The awards (a maximum of \$2,000 per scholarship) will be based on a combination of factors, including, inter alia, financial need, scholastic achievement, contributions to amateur radio and community involvement.

Applications can be had by sending an SASE to: DARA Scholarships, 45 Cinnamon Ct., Springboro, Ohio 45066. The deadline for the submission of applications is June 15, 1999.

Letters, continued on page 101

The radio as weapon

Dale Tar returned to his car, parked in the upper level of a parking garage in Des Moines, Iowa, only to discover he was the victim of a crime. The window was broken and his scanner was stolen. But he soon discovered he wasn't the only victim; for reasons unknown, the thief tossed the scanner over the wall, gashing the head of a passerby below.

Des Moines Police Sgt. David Murillo said "Tossing something from a distance is like shooting something out of a cannon. Launching something like that could result in a charge of manslaughter."

A radio may have been the cause of death of a New York man, who was suspected of engaging in a drug transaction. As Kenneth Banks fled on his bicycle, officer Craig Yokemick threw his 2-pound radio to knock Banks off his bike. Banks later died with a skull fracture and bleeding in the brain, according to hospital records. The case is being investigated.

The radio as weapon, 2

In Waukegan, Illinois, a scanner listener overheard reports of a bank robbery before witnessing the suspect running from the bank into an apartment complex. Armed with that information, the police searched the building and discovered money wrappers in one of the bathrooms. Martin Rinehart Sr. has been charged with one count of robbery, though his accomplice has not been apprehended.

A man wanted on drug charges in Minnesota was spotted and pursued in Iowa in a high speed chase that continued into South Dakota. Finally the suspect, Tracy Fanning, left his car and ran into a cornfield. After several hours of looking for him, authorities listening to a scanner overheard him make a call over his cellular phone, arranging to be picked up. Guess who picked him up instead!

Connecticut — the old and the new

State police union leader Robert Veach says about a third of Connecticut state troopers carry cellular telephones because their own radio network is so unreliable. When three state troopers were shot last September in Willington, neither radios nor cell phones were able to call for backup, and a trooper had to use a neighbor's telephone.

Connecticut's present radio system was one of the first two-way systems in the country in 1940, and it has been slated for upgrade since 1981. Ten years after the new system was chosen, towers and antennas are still being built.

On the other hand, Connecticut has contracted for a modern, all-digital state-wide network for emergency 9-1-1 calls developed by Southern New England Telecommunications (SNET) and a unit of Lucent Technologies.

The equipment, being installed in Public Safety Answering Point (PSAP) systems, allows dispatchers to receive emergency calls and quickly obtain the caller's name, loca-

tion, and problem. PSAP dispatchers then alert the proper fire, police, or emergency medical service (EMS) in the caller's area, to further cut response time.

Vermont has also recently signed with Lucent — the only fully digital and integrated services digital network (ISDN)-enabled PSAP (Public Safety Answering Point) system. Vermont's new 9-1-1 infrastructure can also process all cellular calls originating within the state.

RFI on the high seas

This column has already reported stories of suspected cellular telephone interference with aircraft navigation. Now the use of cellphones on ships is being questioned. Sweden has recommended that shipping firms temporarily ban "mobile telephones" aboard ship, while they study a recent incident in Norway in which a phone apparently caused a ship's rudder to swing hard over while the vessel was under autopilot.

Frequency skirmishes

The International Telecommunications Union (ITU) coordinates global frequency usage in an effort to avoid conflicts, but the founders may never have anticipated the problems of technology (such as the above story), nor the current political scene. Today, floating cities in the form of aircraft carriers can bring a small piece of the United States into any port in the world. Aircraft, satellites,



Saturday, Feb 6: West Memphis, AR

The Dixie Amateur Radio Group is sponsoring their first hamfest on February 6, 1999, DixieFest '99. Location: Eugene Woods Civic Center, 212 West Polk, Talk-in Freqs: 147.150+ and 444.775+. 9am-4pm, admission: \$5. VE testing, Army MARS Meeting, Door Prizes. Contact: Kellye Farris KB5RCE, 432 Ross Avenue, West Memphis, AR 72301, Voice: 870-732-8724, Fax: 870-732-5540, E-Mail: dixiefest@media-two.com - Website: <http://www.media-two.com/DARG>

Saturday, February 6, 1999 - DX test

CHUC-1450, Cobourg, ON, will conduct a DX test from 12:00-6:00am EST, consisting of march music and Morse code IDs. E-Mail: jton@eagle.ca or chuc@eagle.ca Reception reports may be sent to: Mr. John Ton, Engineer, CHUC-1450, P.O. Box 520,

Cobourg, ON K9A2L3 Canada. (Arranged by J.D. Stephens for the NRC CPC.)

Saturday, Feb 13: Harrisburg, PA

Harrisburg RAC's Valentine Hamfest will be held at the Oberlin Fire Company hall [I-283 to Swatara Exit #1; north onto PA-441; follow PA-441 left at traffic light onto Eisenhower Blvd, right at next traffic light, right at stop sign. Fire hall 0.2 mile on the right.] Talk-in 146.76. Admission 8 a.m., \$2 - XYLs, sweethearts and harmonics free. For more info and VE testing location contact n3njb@juno.com or phone 717-939-4825.

Sunday, Feb 14: Brighton, CO

The Aurora Repeater Association is holding its

Annual SwapFest on February 14, 1999, at the Adams County Fairgrounds 9700 Henderson Road, Brighton, Colorado. Doors open at 8:00 am. VE testing available. For information contact Wayne N0POH, P.O. Box 473411, Aurora, CO 80047-3411. Phone 303-699-6335 or email nrclog@aol.com

Monday, February 15: DX Test

KEYZ-660, Williston, ND, will conduct a rescheduled DX test with Morse code IDs and 1000 Hz tones at various intervals from 1:05-1:30 am EST and prior to the news at :00 from 2:00 to 6:00 EST. Both daytime and nighttime patterns will be used between 1:05-1:30. Nighttime pattern only the remainder of the period. Send reception reports to: Mr. Earl R. Gross, KEYZ Radio, P.O. Box 2048, Williston, ND 58801-2048 (Arranged by Bill Hale for the NRC CPC.)

radar, and military bases may also bring US-approved radio frequencies into potential conflict with essential services in the host countries.

Although the U.S. is supposed to receive frequency certification and approval from the host country in which such systems are deployed, an internal Defense Department review found at least 89 cases in which such certification was lacking. Other conflicts with essential services caused by a US civilian presence may have been unanticipated, such as the use of pagers in Japan and baby monitors in Germany.

The Pentagon conceded that the problem is a serious one, which in some countries is causing a number of sophisticated systems such as Patriot missile defenses and Predator unmanned aerial vehicles to remain idle or at reduced capability.

Border skirmishes

On January 1, 1999, Canadian stations are supposed to up their Canadian content from 25 to 35 percent. It has border stations in cities like Toronto and Vancouver worried about losing even more of their market share to U.S. broadcasters. Michael McCabe, president and CEO of the Canadian Association of Broadcasters (CAB) says, "There is some myth that there is some sort of pool of music that a whole lot of people want to listen to, and it is not being played... That music is not there."

According to *Radio World*, "The CAB is considering some kind of mass 'noncompliance' with the new quotas, in an unprecedented effort to overturn the regulations. Given the radio industry's relative lack of clout in Canadian politics, this probably will not be enough to overturn CRTC (Canadian Radio-Television and Telecommunications Commission) policies."

Shuttle, pick up passenger, Calle Cinco

Radio silence for sensitive radioastronomy instruments is a near-impossibility, but the problem is exacerbated by off-frequency services. According to NASA's Johnson Space Center (JSC), the shuttle may experience radio frequency interference (RFI) on 296.8 MHz for periods of 6-7 minutes whenever it passes over Paraguay, Uruguay, or Rio de Janeiro, South America. The interference source is unregulated taxi driver radios which transmit at this frequency and was first noticed during preparations for the Hubble Space Telescope (HST) missions.

The search for SETI begins at home

In our multimedia world, the distinction between art and life, science and science fiction, seems increasingly blurred. So why shouldn't a movie studio help launch a grassroots effort in the search for extraterrestrial intelligence (SETI)?

Paramount Pictures, which just launched the latest in its *Star Trek* movie series, is helping to sign up hundreds of "Trekkie" fans to "seek out new life and new civilizations," using their home computers. The project seeks to use the resources of as many as a million idle computers around the world to process raw data from the Arecibo radio observatory in Puerto Rico.

Participants will be able to download a block of raw data and the software to analyze it. The software works in the background in screen saver mode, harnessing your otherwise unused computer power. Recording of data began at Arecibo on 20 October; testing of the software has already begun, and the final software release to participants is expected April 2nd, 1999.

Although not officially connected with the SETI@home project, the SETI League does endorse the effort, with the caveat that the analysis is, of course, not being performed in real-time. Other sponsors of the project are The Planetary Society, Sun Microsystems, Fuji Film Computer Products, and Informix.

To join the more than 100,000 already signed up, send your browser to <http://setiathome.ssl.berkeley.edu/>

Pete Myers, Deceased

Radio Netherlands announced that Tuesday December 15, Pete Myers lost his fight against cancer at the age of 59. The following is from his obituary by RN.

"Pete was one of the finest feature producers in the business. His scrapbook of newspaper articles is a history of international broadcasting itself. He was instrumental in bringing in-depth interviews to popular channels such as BBC Radio One, and for many years was the front man in BBC's African Service."

"Joining Radio Netherlands in 1976, he was instrumental in re-styling our English language transmissions to Africa and Asia. In later years he shaped our documentary output. His programs tracing the history of Radio Netherlands to celebrate 50 years on air are some of the finest work we have broadcast."

"Many in the English Language Service today regard Pete as their mentor. He inspired people to be creative. He broke through tradi-

tional taboos. His spirit lives on through the people he taught. He will be greatly missed, both here in Hilversum, and by - literally - millions of people around the world."

"Communications" is written by Rachel Baughn (mteitor@grove-ent.com) with the help of these fine contributors: Anonymous, Albany, NY; Anon, Palatine, IL; Chanel Cordell, Brasstown, NC; Kevin Klein, Neenah, WI; Mike Jaeger, Lamoni, IA; Maryanne Kehoe, Atlanta, GA; Stan Lopes, Concord, CA; Fred Maia, *W5YI Report*, Texas; Haskell Moore, Houston, TX; Bob Padula, *EDXP*, Australia; David Parsons, Tucson, AZ; Douglas Robertson, Oxnard, CA; Keith Stein, Woodbridge, VA; Larry Van Horn, Brasstown, NC

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Radio Propagation and the Sun

By Ian Poole G3YWX

The sun has an enormous impact on our everyday lives. Being the chief source of energy it has an enormous influence on our environment. Not only does it affect aspects like the weather we experience, but the sun also has an enormous effect on radio propagation, especially on the HF or shortwave bands. To look at the way this occurs it is necessary to take a quick look at the various areas in the atmosphere to see which areas influence radio propagation and how the sun affects them.

■ The atmosphere

The earth's atmosphere contains a number of different areas and extends to altitudes of

several hundred kilometers. There are a number of methods of classifying the different areas, but the one that is most commonly mentioned is that used by meteorologists as shown in Fig. 1.

Closest to the earth is an area known as the troposphere. It is within this area that most of the weather conditions we experience occur. Low clouds form at an altitude of anywhere up to about 2 km, and the highest clouds are at altitudes of up to about 10 km. To put some of these in context airplanes generally cruise above this at altitudes around up to 12 km.

The troposphere has some affect on radio conditions, although this is generally only noticed on frequencies at VHF and above. Here the experienced listener wanting to hear DX stations will keep a good eye on the weather forecasts.

■ The ionosphere

For many years it has been known that there are ion-

ized layers in the upper reaches of the atmosphere. The idea that this might be true was first considered just after the turn of the century, in separate proposals by two scientists, namely Kennelly in the USA and Heaviside in the UK. Since then far more has been learned about these layers, especially since the first rockets managed to pass through these layers and were able to collect data.

In most regions of the atmosphere it is found that the gasses are in a stable molecular form. However, in certain areas of the atmosphere some of them start to become ionized, splitting into free electrons and positive ions. Of these it is the free electrons that affect the radio signals, although the layer where these ions and electrons are found is still called the ionosphere. This generally starts to happen at an altitude of around 30 km, although at this height the levels of ionization are very small and they do not have an effect on radio signals. However, as the altitude increases the number of ions rises.

The ionosphere is traditionally thought of as having a number of distinct layers. While it is often convenient to think of the ionosphere in this way, it is not strictly true. The whole of the ionosphere contains ions and free electrons, although there are a number of peaks, and these may be considered to be the differ-

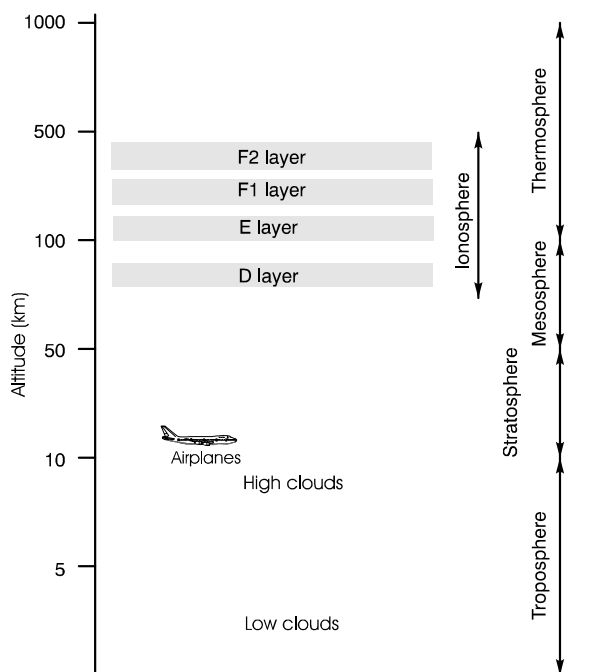


FIG. 1 Areas in the atmosphere



Photo Credit: NOAA

ent layers. These layers are given the designations D, E, and F. A diagram of the approximate levels of ionization is shown in Fig. 2. This can only be very approximate because the levels of ionization vary as a result of a number of factors.

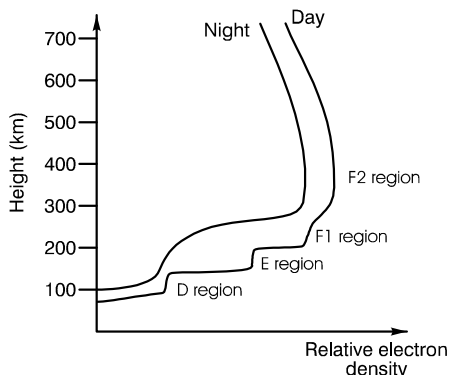


FIG. 2 The approximate levels of ionization in the ionosphere

The lowest of the layers is the D layer. This is found at altitudes between 60 and 90 km. It only exists during the daytime when it is in view of the sun. Above this is the E layer at around 110 km. This exists during the day, and then at night when it is not in sunlight it becomes very much weaker.

Finally there is the F layer. This varies considerably, normally existing as two layers during the day, designated F1 and F2. They

are found at altitudes of around 300 and 400 km in summer, and then during the winter they may fall to around 200 and 300 km. At night the two layers generally combine to form a single layer generally around an altitude of 250 to 300 km. It should be remembered that these figures are only a rough guide, because they change quite considerably according to the time of year and the state of the sun.

■ Formation of ions

The ionization in the ionosphere is generated when radiation from the sun strikes the gas molecules in the upper atmosphere. The radiation is of sufficient intensity that it gives the electron in some molecules sufficient energy to leave the molecular structure. This leaves a free electron, and the gas molecule — having one electron too few — becomes a positive ion.

At very high altitudes the atmosphere is very thin, and as a result the levels of ionization are very low. As the atmosphere becomes denser, so the level of ionization starts to rise. However the ionization process uses up the energy of the radiation, and after a certain distance the energy of the radiation is such that it does not ionize as many gas molecules as before and the level of ionization begins to fall.

It is also found that for the higher layers, including the F and E layers, most of the

ionization results from ultraviolet light. The D layer, being at a lower altitude, results mainly from X-rays that are able to penetrate further into the atmosphere.

It is also found that the free electrons and positive ions slowly recombine. In other words, the radiation is causing them to ionize, and then they slowly recombine afterwards. In chemistry this state of affairs is called a dynamic equilibrium. It means that if the source of radiation is removed, then the levels of ionization will fall.

As a result the D layer disappears after nightfall, and the E layer is greatly reduced in intensity. In view of the high levels of ionization in the F layers and the fact that the air density is so much less, it takes longer for the recombination process to take place and consequently it remains overnight, although its level is reduced.

■ Effect of the ionosphere

The different layers of the ionosphere affect radio waves in slightly different ways. When a signal enters the D layer it sets the free electrons vibrating. As they vibrate they collide with nearby molecules, and after each collision some energy is lost. As a result signals entering the D layer are attenuated. It is found that the level of attenuation is inversely proportional to the square of the frequency.

In other words, doubling the frequency reduces the attenuation by a factor of four. It is found that low frequency signals are completely absorbed by it. This can be shown by the fact that stations on the mediumwave broadcast band can only be heard over short distances during the day, and then at night when the D layer disappears they can be heard over much greater distances.

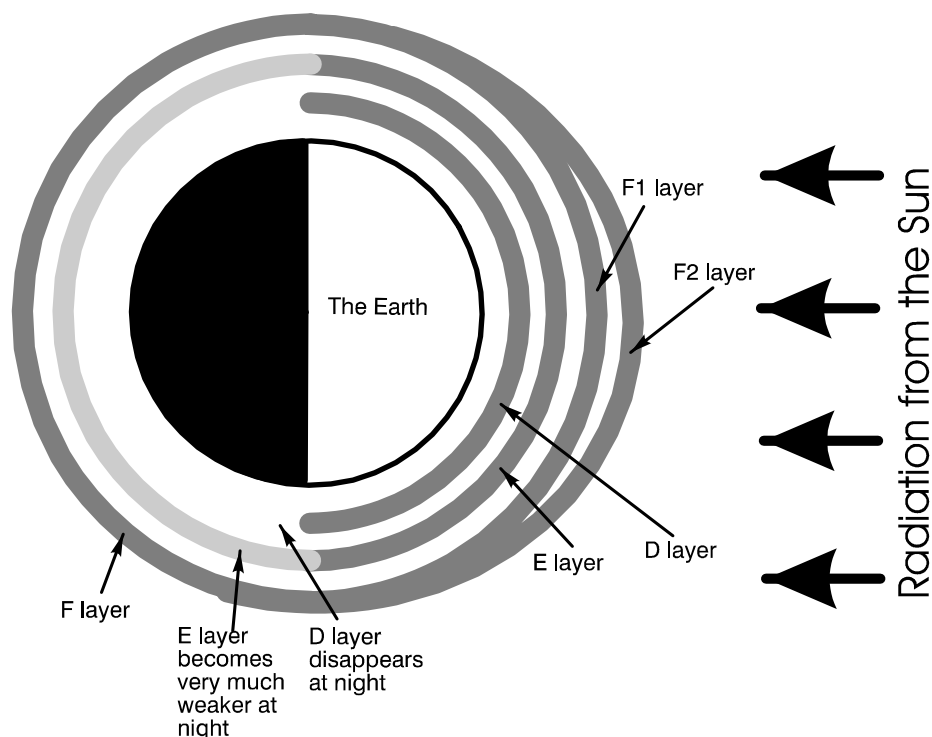


FIG. 3 Variations of the ionosphere over the day

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The effect is slightly different for the higher layers. Being higher in altitude the gas density is much less. As a result a different effect predominates. Again the electrons are set in motion, but as fewer collisions take place they act on the signal to bend it away from the area of highest ionization. In other words the signal is refracted back towards the earth. It is also found that the effect decreases with frequency and as a result the signal will eventually pass through one layer and on to the next.

■ Variations in the ionosphere

The effect of the ionosphere is greatly linked to the amount of radiation it receives. This varies over the period of a day. At night when the ionosphere receives no radiation from the sun, the level of ionization falls and communication may not be possible over some paths or different frequencies may have to be used.

Other changes also affect the ionosphere.

In just the same way that winters are colder because that part of the earth receives less warmth from the sun, so the ionosphere receives less radiation, and the levels of ionization in the ionosphere fall.

■ Sunspots

Changes on the sun itself also affect the ionosphere. One of the major changes occurs as the result of the sunspots that appear on the surface of the sun.

If the sun is viewed by projecting its image onto a screen, then a number of dark areas may be seen from time to time. These spots may last from anywhere between a few hours to days or even weeks. The spots are areas where the surface of the sun is cooler than the surrounding areas. The temperature of the spots is only about 3000 C. This is quite cool when compared to the temperature of the rest of the surface that is around 6000 C! However, it is very much hotter under the surface where

temperatures reach in excess of a million degrees.

The sunspots are areas of intense magnetic activity. The magnetic fields in these areas are enormous, and as a result the surface of the sun is disrupted. This causes the surface temperature to fall in these areas and a darker area to be perceived.

Around the sunspot itself there is an area that is known as a plage. This is slightly brighter than the surrounding area and is a large radiator of ultraviolet radiation and X-rays. The amount of radiation emanating from the plage means that there is an overall increase in the level of radiation from the sun. In fact it is noticed that the level of radiation from the sun can be estimated from a knowledge of the number of sunspots that appear on the surface.

As sunspots often appear in groups, a method of trying to estimate their effect has been devised. A figure known as the sunspot

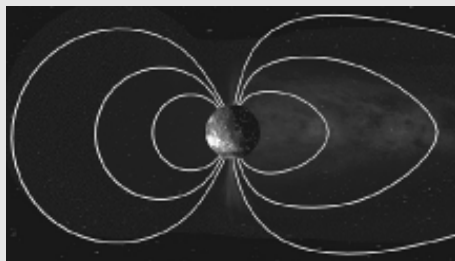
Solar Wind Squeezes Earth's Atmosphere into Space

Researchers using NASA's Polar spacecraft have found the first direct evidence that bursts of energy from the Sun can cause oxygen and other gases to gush from Earth's upper atmosphere into space. Scientists first saw this effect September 24-25, 1998, when a storm from the Sun smacked into the Earth. Using particle detectors on Polar, they found that the flow of "polar wind" out of Earth's upper atmosphere increased substantially when the storm hit. In effect, pressure from the solar ejection squeezed gas out of the ionosphere.

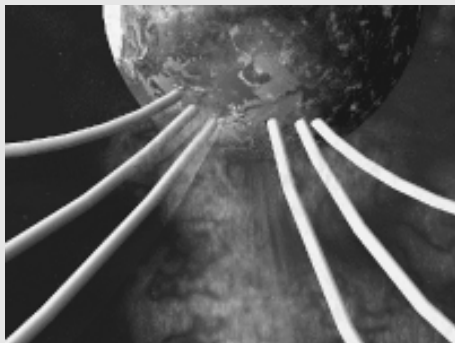
Scientists have known since the early 1980s that Earth's upper atmosphere leaks oxygen, helium, and hydrogen ions (atoms that have gained or lost an electron) into space from regions near the poles. But it was not until the Polar spacecraft flew through this fountain of ionized gas in September 1998 that scientists confirmed that the flow of ions was caused by solar activity.

"We now have the first direct, quantifiable evidence that disturbances in the solar wind produce changes in the flow of ions out of the ionosphere," said Dr. Thomas E. Moore of NASA's Goddard Space Flight Center, Greenbelt, MD, principal investigator for Polar's Thermal Ion Dynamics Experiment (TIDE). "This solar wind energy essentially 'cooks' the upper atmosphere off of the Earth."

On September 22, 1998, the Sun ejected a mass of hot, ionized gas (known as plasma) toward Earth. This magnetic cloud of plasma (called a coronal mass ejection) increased the density and pressure of the solar wind and produced a shock wave similar to a sonic boom. When that shock wave arrived at Earth late on September 24, it rammed into and compressed Earth's magnetic shell in space (the magneto-



Artist's conception of Earth's magnetic field in space (or magnetosphere)



Cold plasma escapes Earth's ionosphere from the south pole. The lines represent the field lines of Earth's magnetic field.

sphere). This shock to the magnetosphere excited the plasma trapped in Earth's ionosphere to a point where some ions gained enough energy to escape Earth's gravity and flow downwind of Earth. The amount of oxygen and other gases lost from the ionosphere amounted to a few hundred tons, roughly equivalent to the mass of oxygen inside the Louisi-

ana Superdome.

"This is the supply of plasma that makes things interesting in space," said Moore. "Much of the gas ejected from the ionosphere is caught in Earth's wake. It then flows back toward the Earth while being heated and accelerated by the same processes that create auroral particles and the radiation belts."

The ionosphere is a series of invisible layers of ions and electrons that are suspended in Earth's upper atmosphere at about 50 to 650 miles (80 to 1,000 kilometers) in altitude. These particles are produced when the Sun's ultraviolet light ionizes the atoms and molecules in the upper atmosphere. The ionosphere makes long-distance radio communication possible by reflecting radio waves back to Earth. It also is home to the aurora and the electrical currents that heat the upper atmosphere during magnetic storms.

"Our research shows that Earth's own ionosphere is a major contributor to the growth of space storms," said Barbara Giles, a co-investigator on the TIDE team and researcher at Goddard. "These new observations will help us understand the conditions that enable space storms to form, thereby moving one step closer to the forecasting of the most damaging storms."

Prior to the launch of Polar, such observations of ions flowing out of the ionosphere were nearly impossible. But the TIDE instrument was specifically designed to neutralize the electrical charge that naturally builds up on the surface of spacecraft due to sunlight (about 40 to 50 volts). By squirting a small plume of Xenon ions and electrons, TIDE offsets the charge on the spacecraft and allows detectors to observe cold plasmas like the oxygen ions seen during the September event.

number is used. This number does not represent the number of spots themselves, but the level of activity on the sun; the sunspot number is very closely related to the amount of radiation received from the sun.

The daily readings of the sunspot numbers fluctuate considerably. To overcome this, the readings are smoothed mathematically to take out the erratic nature of the readings so that the underlying trend can be seen. This number,

called the Smoothed Sunspot Number (SSN) is often quoted in association with propagation reports.

■ The sunspot cycle

The number of sunspots on the sun's surface varies. On some days very few, or even none may be seen, whereas at other times there are very many. The daily number varies

considerably over a short period of time as the sun rotates, but if the smoothed sunspot number is used it can be seen that there is a much longer-term trend. This trend shows that the number of sunspots rises and falls over a period of approximately eleven years. This number is only an approximate guide because there is a considerable amount of variation on this.

Records of the sunspot numbers have been kept since the mid-eighteenth century, and by referring to these records it has been possible to track the cycles since then. Cycle 22 started in September 1986 with a number of 12. It rose rapidly over the next 33 months to reach a peak of 158. From then it fell slightly and rose again to give a second smaller peak before ending in 1996. Now cycle 23 has started and the numbers are again rising.

■ The effect of the sunspot cycle

Most short wave listeners and DXers look upon rising sunspot numbers with anticipation. The increased numbers of sunspots mean increased levels of radiation. In turn, this means that there are greater levels of ionization in the ionosphere. Accordingly, this af-

Earth's Own Magnetosphere, Not Solar Wind, Accelerates the Particles of the Radiation Belts

Forty years after James Van Allen discovered the radiation belts, scientists have found that Earth's space environment is a massive particle accelerator, boosting electrons to near light speed in a matter of minutes. By using the coordinated measurements from two dozen spacecraft together with sophisticated computer models, scientists should soon be able to make "weather maps" of this acceleration, allowing predictions of the intensity of the radiation belts and the location of the most active regions. The acceleration of particles inside the radiation belts can affect the operation of satellites.

The Van Allen radiation belts are a pair of doughnut shaped rings of ionized gas (or plasma)

trapped in orbit around Earth. The outer belt stretches from 19,000 km (11,500 miles) in altitude to 41,000 km (25,000 miles); the inner belt lies between 13,000 km (7600 miles) and 7,600 km (4,500 miles) in altitude.

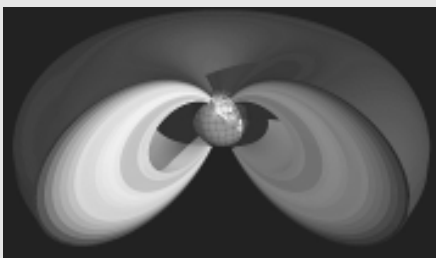
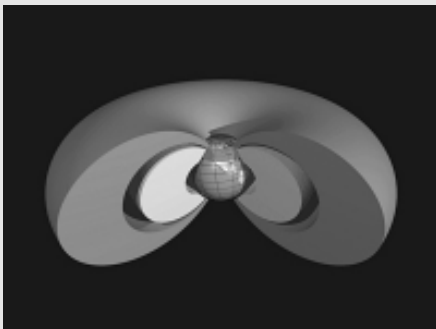
For decades, space physicists theorized that the Sun and its solar wind provided most of the high-energy particles found in Earth's radiation belts. But new observations from the International Solar-Terrestrial Physics (ISTP) program and other missions suggest that Earth's own magnetic shell in space, or magnetosphere, is a more effective and efficient accelerator of particles.

According to Dr. Geoffrey Reeves of Los Alamos National Laboratory and an investigator for ISTP, the solar wind and Sun are insufficient sources for the radiation belts. "There are just not enough high-energy electrons in the solar wind to explain how many we observe near Earth," said Reeves, who discussed the findings on December 7 in San Francisco during the Fall Meeting of the American Geophysical Union.

Data from NASA's Polar and SAMPEX spacecraft, as well National Oceanic and Atmospheric Administration (NOAA) and the Department of Defense satellites, show that the radiation belts change in response to a variety of solar events. High-speed streams of solar wind, coronal mass ejections, and shock waves from the Sun all can compress and excite the magnetosphere. But it is the pressure and energy of these events, not the particles buried in them, that energizes the particles trapped inside the radiation belts.

"It is amazing that the system can take the chaotic energy of the solar wind and utilize it so quickly and coherently," said Dr. Daniel Baker of the University of Colorado, an investigator for ISTP and SAMPEX. "We had thought the radiation belts were a slow, lumbering feature of Earth, but in fact they can change on a knife's edge."

Discovered in 1958, the radiation belts have long been treated as a relatively stable and predictable phenomenon. But in studying recent space weather events, space physicists have found that the intensity of the belts can vary by 10, 100, or even 1000 times in a matter of seconds to minutes. "The radiation belts are almost never in equilibrium," said Reeves. "We don't really understand the process, but we do know that things are changing constantly."



Earth's Radiation Belts as Measured by NASA's POLAR Satellite. These 3D images show how the Earth's radiation belts can change in size and intensity, waxing and waning in response to solar activity and acceleration inside Earth's magnetosphere. The images are drawn from data on energetic particles, as collected by NASA's Polar spacecraft. Credit: Mike Henderson & Geoff Reeves/Los Alamos National Laboratory

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New Findings Challenge Beliefs about Solar-Terrestrial Physics

By J. T. Gosling, Los Alamos National Laboratory, Los Alamos, N.Mex.

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Almost all major energetic particle events observed in the vicinity of the Earth are produced by ... fast CMEs rather than by acceleration at flare sites on the Sun.

Solar flares are intense, short-lived brightenings that occur near sunspots on the Sun's surface. Large geomagnetic storms, intense auroral displays, large energetic particle events in interplanetary space, and major shock wave disturbances in the solar wind often occur in close association with large solar flares. Over the years, the common association of these events in near-Earth space with solar flares led to a paradigm of cause and effect in which large solar flares came to be understood as the fundamental cause of these disturbances.

Certain aspects of this paradigm were developed in the early 1930s [e.g., Hale, 1931], and by the early 1960s it had become part of the underlying dogma central to the discipline of solar-terrestrial physics. This paradigm still dominates the popular perception of the relationship between solar activity and interplanetary and geomagnetic events and continues to provide much of the pragmatic rationale for the study of the solar flare phenomenon.

We now know, however, that the above paradigm is wrong [e.g., Kahler, 1992; Gosling, 1993] and that most major, transient disturbances in near-Earth space are produced by solar events known as coronal mass ejections (CMEs), which involve the ejection of very large quantities of solar material (10^{+15} - 10^{+16} g, equivalent

to the mass of about 100,000 aircraft carriers) into interplanetary space. In contrast to solar flares, which are relatively easy to observe and have been studied for more than a century, CMEs are not detected easily. In fact, CMEs were not observed directly until special telescopes known as coronagraphs were first flown in space in the early 1970s. Figure 1 shows two snapshots of a CME observed with the coronagraph flown on Skylab.

Many CMEs, including some of the more spectacular ones, erupt from regions well away from sunspots and any apparent flaring activity. Our present understanding of CMEs is that they are not produced by flares even though CMEs and flares sometimes occur in close temporal association with one another. It is likely that both CMEs and flares arise from instabilities connected with the evolution of the magnetic field in the solar atmosphere. CMEs probably result more from changes in the large-scale magnetic field that permeates the solar corona, and flares probably result more from changes in the stronger but smaller-scale fields associated with sunspot regions lower in the solar atmosphere.

CMEs move outward from the Sun into interplanetary space with speeds as low as 50 km/s and as high as 1200 km/s or greater.

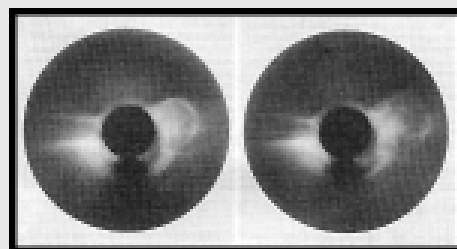


FIGURE 1. Two snapshots of a CME observed above the west limb of the Sun with the white light coronagraph on Skylab on August 10, 1973. The field of view of the photographs is six solar diameters, and the snapshots are separated in time by 24 minutes. As is common in many of these events, this CME was not associated with a solar flare.

The slower CMEs do not produce significant disturbances in the solar wind, nor do they seriously perturb the Earth's magnetosphere or ionosphere. On the other hand, the faster CMEs, which account for a relatively small fraction of all events, usually produce very large disturbances in the solar wind.

The faster CMEs typically contain shocks on their leading edges and strong magnetic fields in extended regions following the shocks. These strong fields are primarily a result of compression that occurs as a fast CME rams into slower solar wind ahead. When the Earth's magnetosphere intercepts one of these CME-driven disturbances, large geomagnetic storms and spectacular auroral displays often result, particularly when the magnetic field carried by the solar wind is directed southward.

The strong interplanetary shocks driven by the faster CMEs are also effective in accelerating solar wind ions they intercept to energies in excess of several millions of electron volts. Only a small fraction of the solar wind ions intercepted are accelerated to these energies, but the flux of these newly accelerated ions is quite large relative to the background flux associated with galactic cosmic rays. Recent work [e.g., Reames, 1992] indicates that almost all major energetic particle events observed in the vicinity of the Earth are produced by acceleration at shocks in interplanetary space that are driven by fast CMEs rather than by acceleration at flare sites on the Sun.

It is now clear that most major transient interplanetary and geomagnetic events are produced by disturbances associated with fast CMEs. It is also clear that solar flares play no fundamental role in producing CMEs. Nevertheless, solar flares continue to be interesting events to study since a number of complex, energetic, and poorly understood processes, including particle acceleration, occur during flares.

fects propagation on the HF bands.

At the sunspot minimum, frequencies up to only around 15 to 20 MHz are normally supported during the day. However at the maximum, the upper limit of affected frequencies may extend beyond 60 MHz.

This means that in the sunspot minima popular ham bands like 24 and 28 MHz may not support communications via normal ionosphere modes. Often 28 MHz will appear dead with no stations audible. However, during periods around the maximum it is an excellent band. Low power stations or those with poorer antennas find it particularly good. As the D layer attenuation is much less, even low power stations can make excellent contacts.

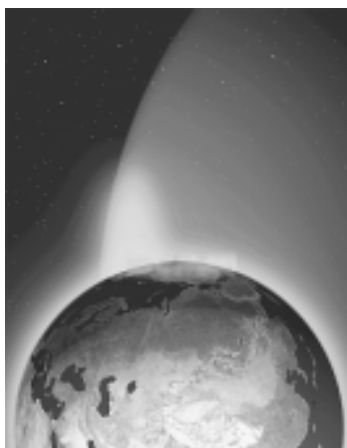
The sunspot number can be used to give a very rough guide as to what conditions may be like. The figure tends to vary from about 65 at the minimum of the cycle to over 300 at the maximum. For good conditions on the higher frequency bands it is found that a figure of in excess of about 100 is required. Up to date figures can be accessed from a variety of web sites including <http://www.sunspotcycle.com>

■ Finale

Naturally, this is only a broad introduction to one aspect of the fascinating topic of radio wave propagation. For anyone interested in reading more, I have written a book entitled *Your Guide to Propagation*, recently published by the Radio Society of Great Britain. It is available in the US from a number of outlets or it can be bought directly from the RSGB at Lambda House, Cranborne Road, Potters Bar, EN6 3JE, England, www.rsgb.org.

More information about radio propagation and many useful links can be found on Ian Poole's Radio and Electronics Web Site, http://website.lineone.net/~ian_poole

Plasma Fountain. This figure depicts the oxygen, helium, and hydrogen ions that gush into space from regions near the Earth's poles. The faint gas shown above the north pole represents gas lost from Earth into space; at the base of the gas is the aurora borealis - or plasma energy pouring back into the atmosphere. Figure Credit: NASA



Ian Poole has been interested in radio for many years and gained his amateur license in 1969. He is an electronics engineer employed as a manager in a radio communications company. Ian Poole is author of twelve books and many articles in radio and electronics magazines in the UK, Europe, USA, Canada, and Australia.

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How to Identify FM Skip

By John Mayson



Photo Credit: Jack Elliott

One afternoon you flip on your scanner. To your surprise you hear police and fire calls on the VHF low band (30 to 50 MHz). Your county is on an 800 MHz trunked system and surrounding communities use UHF. Fire trucks are dispatched to apartment complexes you've never heard of. A patrolman stops a Chevy Blazer on U. S. Highway 24 east of Rushville. An ambulance rushes a patient to Christ Hospital, but the dispatcher points out that Holy Cross Hospital is closer, plus she notes there's an accident at 95th and Cicero.

You know you're hearing distant stations, but you find the information from your scanner absolutely useless. No one mentions a city you recognize. You don't stand a chance against the high speed Morse code repeater IDs. Out of utter frustration you disassemble your scanners and unsolder every component. You mail all those parts to different countries so there's no chance anyone can ever piece them back together and allow those scanners to torture you again.

How sad. Had you only loaded your favorite web browser while you were checking your e-mail, you could've saved yourself the trouble of sending scanner guts across the globe.

What is happening?

We expect to hear distant mediumwave stations on our AM radios at night. Likewise we expect to hear distant international broadcasts on shortwave. But why would we hear distant stations on the public safety bands? The answer is simple. Skip.

Short skip is due to effects of the troposphere (ground zero up to six miles), and the meteorological conditions within it. This includes ducting, in which a radio signal is quite literally sucked through the lower levels of the atmosphere and carried many miles away.

Longer skip is due to the ionosphere which is affected by solar activity. Layers within this



Photo Credit: Bob Grove

region can reflect the wave rather than letting it travel into space. These layers extend up to 350 miles. It is the highest of these layers, the F2, that is predominantly responsible for VHF-low band skip.

But knowing *why* you're hearing them doesn't help you know *who* you're hearing: How do you identify these distant stations?

Paper or plastic?

There are some questions whose answers define us as a people. Coke or Pepsi? Ford or Chevy? Smoking or non-smoking? Our cohesive radio subculture is not immune to these petty differences. There are those who swear by publications in book form, such as *Police Call* edited by Gene Hughes or the Scanner Master publications. Yet others rely on their computer and use one of the various FCC databases available on CD-ROM. I have witnessed, and even participated in many a lively

If the accent sounds like the Dukes of Hazard, you can bet you're not hearing New York

debate on the Internet over this divisive issue. Which one should you use?

All of these mediums are widely available. This very magazine is full of ads for businesses offering these products. So which should you consider using? Personally, I always DX with a *Police Call* and a CD-ROM by my side.

Police Call is an annual publication always available at your local Radio Shack. The publisher actually puts out nine different volumes covering various parts of the country. You might find it necessary to buy two different volumes if you live near a volume dividing line. You can find out more by surfing over to <http://www.policecall.com/> or by visiting your local Radio Shack.

The Scanner Master publications contain more thorough information and typically cover a smaller geographic area. Despite the fact they aren't updated as frequently, I highly recommend their books.

CD-ROMs take raw FCC data and present it in a user-friendly form. These are typically updated once every six to twelve months and cover everything over which the FCC has jurisdiction, from a taxi company in Maine to a marine HF station in Guam. Generally a user can search by frequency, frequency range, call sign, city, county, state, and radio service. Many CD-ROMs work under MS-DOS, all versions of Windows, and Macintosh, but check the specifics before you order.

I have taken my share of heat over this "paper or plastic" issue, but I have always maintained that one can never replace the other and here are my reasons why.

A CD-ROM lists the license holder which is usually just a state or municipality. *Police Call* goes a step farther and lists the agency that uses a particular frequency. Instead of seeing "Massachusetts, Commonwealth of" you'll see "Massachusetts State Police Troop D." That right there is a big plus for the book form of a frequency list.

But what if you live in Texas and don't have a book covering Massachusetts? Sure, you could order *Police Call: Volume One*, which covers New England and New York, but you can't stop there. Back in December 1997, there was a spectacular VHF band opening and I logged at least a dozen states representing six different *Police Call* volumes. That's a lot of pages to thumb through. Not to mention a significant amount of money.

So what are some of the other pros and cons? You can take a book most anywhere. It's not always that easy with a CD-ROM because it requires a computer. Books are easy. You don't have to boot up a book. Books don't give you "General Protection Faults" or catch nasty viruses. If you drop your book in a puddle, you are, at most, out the cost of a sushi dinner.

On the other hand, you can't beat the searching capabilities of a computer. Many times I have caught part of a Morse code repeater ID, scanned for that, and based on the frequency and geographic area, found my mystery station. Did you ever consider you might hear a fire call on 33.64 MHz and want a list of every licensee in the country using that frequency? Well, I did ...



The Internet

To be totally honest with you, I do not know how people DXed before the explosion of the Internet. Let me rephrase that: DXing was easy — identifying your catches was a task. Here's a real life example of how I used the Internet to identify a station.

One evening I heard a fire-rescue call to a facility called "New Horizons" on 4500 West Midway. I looked in my *Police Call* and saw many possibilities for that frequency. I live in the center of a flat state which means signals can come from any direction and they usually do. However, I had another problem not unique to this particular station or even this state. The county often provides dispatching service.



Therefore the FCC license is issued to the county. Was this address in the county seat? A small town? An unincorporated part of the county? How would I search for this?

There are many on-line phone books out there. All of them serve their purpose. However one stands out above all the rest for radio hobbyists. That one is the Yahoo! Yellow Pages <http://yp.yahoo.com/>. What makes this one so special? You can specify a city and search in that vicinity, not just the specified town. If you search in Raleigh, for instance, you can expect to find businesses all over the Raleigh-Durham area.

Since conditions were not particularly great the evening I heard the call to "New Horizons," I had a hunch I was hearing the Saint

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PUBLIC SAFETY - BUSINESS

GOT A SCANNER? GET POLICE CALL



Photo Credit: Gary Watts

Warren, Michigan Fire Department

Lucie County Fire-Rescue Department. But to verify this, I would need to see if a business called "New Horizons" existed somewhere in Saint Lucie County. The principal cities in this Treasure Coast community are Fort Pierce and Port Saint Lucie. I chose to search Fort Pierce for this particular establishment and, sure enough, it was there in Fort Pierce at the address mentioned by the dispatcher! I had confirmed without a doubt I had heard Saint Lucie County. The beauty of Yahoo!, though, is that, had "New Horizons" been located in Port Saint Lucie, Jensen Beach, or any other area community, I still would have located it.

This seems easy!

Easy eh? Let me give you another real life scenario. At the end of May 1998 we had a spectacular band opening here in Florida. I heard a fire-rescue call on 33.64 MHz, but only heard "xxx Rosewood Lane in the Longwood development." Based on this information, how would you go identify this station?

It's not as impossible as you think. First I loaded up my CD-ROM and did a nationwide search for "33.64 MHz." I found several users of this frequency, but some I could rule out almost immediately. I was confident I hadn't heard California; it's just too far away¹ and not from the right direction for the skip that day.

Throughout that particular day every DX station I had heard was in the middle Atlantic or northeastern United States. More than likely, my mystery station was there. Why? Because

long distance band openings tend to occur between two particular geographic regions. In Florida it's not uncommon to hear the Indiana and the Illinois State Police one day, only to hear South America the next. But I can't think of a time when *both* regions were audible.

Also, band openings are bi-directional, meaning if stations in point "A" are being heard in point "B," then point "B" stations should be heard in point "A." I met a gentleman on the Internet who is a patrolman for the Missouri State Highway Patrol. At one time they shared a frequency with the Ontario Provincial Police. He would be driving along the highways of the Show-Me-State and suddenly hear a call concerning a dead moose "ah-boot" fifteen kilometers from Peterborough. Yes, regional accents can sound funny to us, but these provide vital clues to the identity of a station. More on that later.

I do not like paying taxes, especially not high federal taxes. However, I can almost accept those huge tax bills because Uncle Sam has provided us with this web site from the United States Geological Service. The URL is <http://www-nmd.usgs.gov/www/gnis/>



[gnisform.html](http://www-nmd.usgs.gov/www/gnisform.html) and it's full of valuable information. Not only does it contain geographic information about cities and towns, but buildings, shopping centers, churches, day cares, almost anything you can possibly think of. Remember where you attended elementary school? Enter the school's name on this page and get all sorts of nifty data on it. Even a nice map. It's great.

But back to my radio riddle. I had a list of stations using 33.64 MHz, which included call sign, licensee, city, county, and state — all concentrated in the northeast and California. I had a street address and a neighborhood.

I entered the neighborhood name into the USGS web page which generated another list, this time of populated places with "Longwood" in the name. In less than thirty seconds I saw the common denominator: Talbot County, Maryland. All afternoon I had heard the Maryland State Police, so this intercept made perfect sense.

Are you a skeptic? Were there multiple common denominators? You can go back to Yahoo!, look up the address given by the dispatcher and see if it's near the city of license.

That seems like a lot of work

Hey, if this hobby were easy it wouldn't be worth doing, right? Seriously, the 33.64 MHz example is probably about as hard as it gets. Also keep in mind there are many other clues to listen for that don't even require a computer.

Is that English he's speaking?

I was born and raised in the southeastern United States. I married a woman from New England. I still can't get accustomed to the accents up there. A speaker's accent can often times narrow down what you have heard.

Too many broadcast stations hire announcers who don't sound like they're from anywhere. A disc jockey in Alabama sounds just like a DJ in Alaska. Fortunately, police, fire, highway patrol forces tend to hire local people who speak like everyone else in that area. Suppose you heard a transmission on 42.34 MHz. If the dispatcher and police officer sound like the cast of the movie *Good Will Hunting* you can bet you're hearing the Massachusetts State Police and not the South Carolina Highway Patrol. Likewise if on 42.90 MHz you thought you were listening to the police department from the TV show *Dukes of Hazard*, you probably had the North Carolina Highway Patrol and not the Illinois State Police.

My cop has no accent

Does your cop mention a highway number? An interstate? A county? A city? Every DXer — be it a broadcast band DXer or a scanner enthusiast — absolutely *must* own a good road atlas. They cost about the same as shiny new pack of eight AA batteries.

Familiarize yourself with our nation's Interstate and U. S. Highway numbering system. If you do start hearing the names of highways, towns, villages, and counties, you can often narrow down or even completely identify a mystery station. Often I'll enter a frequency into my database and perform a nationwide search. I get a list of licensees, I eliminate the impossibilities, then start looking in my atlas at the possibilities. U. S. 41 runs through Wisconsin, but it doesn't run through Nebraska. If those two states are your choices and an ambulance is responding to an accident on highway 41, you know you don't have Nebraska.

What else can I use?

Some clues are rather esoteric, but do work. As far as I know, almost everyone in the free world uses "10-4" to mean "acknowledged." I can think of two examples where this isn't true. One is the Miami-Dade area. They use "QSL" instead of "10-4." However, both the city of Miami and Dade County are on 800 MHz trunked radio systems, so it's highly unlikely you'll hear them much beyond the 305 area code. On the low-band, however, there's a good chance you'll hear the New Hampshire State Police using "10-5."

Another hint is knowing your state agencies, particularly state law enforcement agencies. Local police and sheriff departments will make frequent mention of the state agency responsible for patrolling the highways. If you hear "OSP is on scene" and you can't decide if you have a sheriff's department from Ohio or Pennsylvania, the dispatcher is probably referring to the Ohio State Patrol. There are three categories of state law enforcement: state patrol, highway patrol, and state police. Exceptions are Alabama and Texas who chose to be different by calling their highway patrol the Department of Public Safety.

There are differences between patrol forces and police forces. Highway patrol and state patrol officers are full fledged law enforcement officers, but their mission in life is enforcing the rules of the road and protecting the driving public. The state police in most states have the added role of providing day-to-

day law enforcement to smaller communities who can't afford their own police force. This is quite common in New England. A state cop can catch a speeder on the Massachusetts Pike one morning, then respond to a bank robbery that afternoon.



As usual, there are exceptions to this. The Arkansas State Police doesn't provide this service, the county sheriff departments do. Likewise, the Louisiana State Police lets the local parish sheriff departments handle this task. However, if you're hearing everything from highway stops to 911 hang-up calls, you probably have a state police force and not a patrol force. The trick is knowing which state has what.

We're all familiar with the stereotype of the police targeting out-of-state drivers for tickets, but truthfully the vast majority of traffic stops involve drivers from within the state. If every traffic stop you've heard has involved drivers and cars from Kansas, you probably have the Kansas Highway Patrol. That or Kansans have made a mass pilgrimage to another state and they all decided to drive at unlawful speeds. Hearing the KHP is the more plausible explanation.

I'll leave you with a parting tip. Often you have to think outside of radio. It's easy to get bogged down with nothing more than frequency lists. Listen to *everything* you're hearing. It's amazing the information you can deduce just from a couple of minutes of monitoring.

As you become more and more experienced, you'll be able to identify distant sta-

tions based solely on how they sound. Florida law enforcement tends to be very formal, using only unit numbers and 10-codes. Other states will use officers' last names and plain English descriptions of accidents, robberies, and other crimes. If you're really good, you might get to the point where you recognize a dispatcher's voice. If you ever get to that point, you should either seek help or write a scanning article for *Monitoring Times*.

John Mayson has been a radio hobbyist for close to twenty years and currently works as a test engineer in the Austin, Texas area.

¹ ... but not impossible: Brian Webb reported regular East Coast and Florida reception from California in his January 1993 MT article on low-band skip - ed.

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GOT A SCANNER? GET POLICE CALL

Radio Australia Looks to the Future

by John A. Figliozzi



Having traveled extensively in Canada, I was struck by some stunning similarities — in a broadcasting sense — as I traveled in Australia. These are both large countries with relatively small populations widely interspersed at points throughout. In both cases, a national public broadcaster had been successfully called upon to serve as a catalyst for unity and national identity. And in both cases, these national broadcasters had spawned international radio services whose mission was to project that identity overseas.

But that is the past. And one important thing I learned on my visit to **Radio Australia** is that while it might be comforting to discuss **RA** and its parent corporation, the **Australian Broadcasting Corporation (ABC)**, in terms of its past accomplishments and what it has historically meant to Australia, little of that is at all helpful now. There are new realities to be dealt with. How successfully they are dealt with will dictate the future — even, perhaps, whether there is a future — for the **ABC** and **Radio Australia**.

These new realities have in some ways sneaked up on **RA**, but they did not arrive overnight. The signs had been there for some time. Over the last decade, the international service had:

- seen its one-time global focus reduced to a regional one;
- experienced progressive, almost annual cuts in its budget and resources;
- suffered the loss of its shortwave transmitting capacity to India (at the time, the station's largest and most devoted audience), after the 1996 shutdown of its Carnarvon transmitting facility.

Perhaps **Radio Australia** should have been on notice that the old rationale was not going to be enough. But as **RA**'s Network Manager Jean-Gabriel Manguy points out in the accompanying interview, it might have taken this most recent round of drastic cuts in 1997 to force the broadcaster to fully recognize the new realities and respond accordingly. And make no mistake about it, the cuts were of shocking proportions. The service's budget was slashed from Aus\$13.5 million to Aus\$6.3 million. Staff numbers were reduced from 144 to 73. The Darwin transmitting facility was mothballed, effectively curtailing shortwave capacity to Asia. Broadcasts in Cantonese, Thai and French were forced to cease, and those in Mandarin and Indonesian were significantly reduced.

Through it all, though, **Radio Australia** has proved resilient. Despite the continual cuts and forced contractions, **RA** has assiduously preserved the value of the service, maintained its professional character and sustained a unique "sound" and identity among international broadcasters. The good news is that **Radio Australia** continues to be in good hands. Mr. Manguy and his staff are a broadly talented and deeply committed group who already have instituted plans that are reaping positive results. To be sure, the road will not be without some potholes, but **Radio Australia**'s future is already looking more promising and secure.

The accompanying articles and pictures are intended to give some insight into **Radio Australia** as it prepares to enter the new millenium.



*After closure of Carnarvon in 1996 and Darwin in 1997, the Shepparton aerial group is all that currently remains of **RA**'s shortwave transmitting capacity.*

An Interview with **RA** Network Manager Jean-Gabriel Manguy

After a quarter-century of service at **RA** with the French and English services in various production and managerial capacities, Jean-Gabriel Manguy was appointed Network Manager in August 1997. Mr. Manguy's background has afforded him extensive first-hand experience as a broadcaster, reporter and educator throughout the Asian and Pacific regions.

Our discussion took place at the ABC Southbank Complex in Melbourne on a mild midwinter August day. Mr. Manguy spoke quietly, thoughtfully and confidently about **RA** and its future. I began by asking Mr.

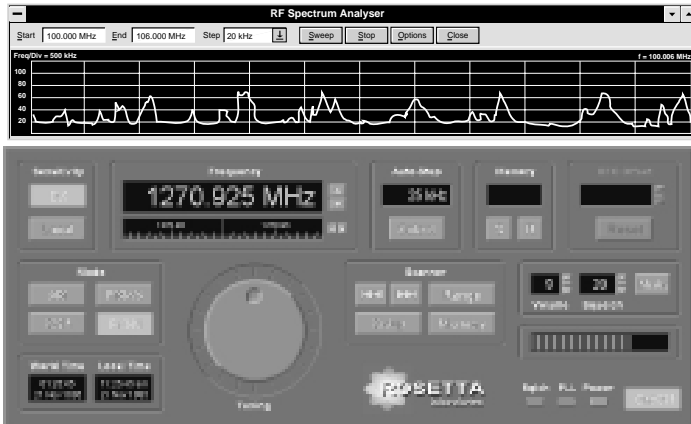


Manguy what had to be done after the cuts to make **RA** stable and safe?

Mr. Manguy - "When **RA** had its budget severely cut, there was a perception within the Australian Government and the **ABC** that **RA** wasn't that relevant any more ... In government circles the perception is that shortwave isn't an effective means of reaching audiences. The **ABC** questioned the value of this international service to the way the **ABC** is trying to [re]position itself. Pressure was being applied from both sides, as well as from international competition and competition

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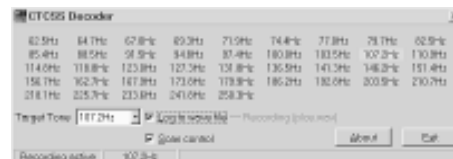


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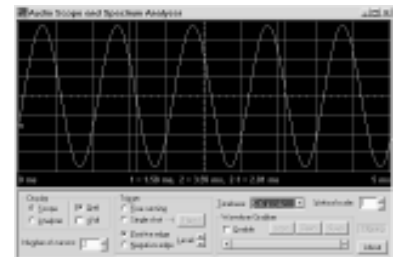
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from other media. It was a matter for us to prove that we can still deliver audiences effectively through shortwave and other means and to prove that we are of value to our broader organization...

"The tsunami disaster in Papua New Guinea proved once again that shortwave was able to reach into a region ... So in terms of the Pacific

that legitimacy is recognized ... In terms of the rest of the world from the Australian government's perspective, there is no need for RA.

"One of the arguments is that *Australia Television International* is sufficient to project Australia effectively in Asia—a view which, of course, we challenge because it's televi-

sion and it's in English only. So the government says we are still of value in the Pacific but not in the rest of the world. Therefore we have to justify the rest to them. And since the government isn't supporting our Asian language operations, we have to justify them to the ABC.

"I suppose this reflects what's going on around the world. International public broadcasters [historically] were funded by governments to push a certain image or certain views. Now we find that we belong not to a nation but to a media organization — the ABC, which votes our budget every third year. So we asked: Where is our place in it? Where is our niche?

"We decided to focus on what we know best at RA, and that's Australia's immediate neighbors. We have established ourselves as the ABC's specialist network on Asia and the Pacific. And since we are doing what no one else is doing within the organization, this is what makes us unique and essential and gives us a future.

"We also know that the world — North America in particular — is keen to know what's going on in this part of the world. RA and the ABC are among the few that can provide them with this content. There's no point in our expending resources on coverage of Europe or South America. So that is the way we are positioning ourselves in terms of

The Mansfield Report

How did **Radio Australia** get to this point?

For years, RA has suffered a series of funding and service cuts. But the most recent round was the unkindest cut of all. In the interview with RA Network Manager Jean-Gabriel Manguy, he alluded to the fact that part of the reason might have had something to do with the strained relationship between the Government of the day and the ABC, the nation's public broadcaster. Indeed.

Over at least the past decade, the ABC has been under withering attack first by the previous left-wing Labour government, then by the current right-wing Liberal-National coalition, for alleged bias in the coverage of news and current affairs. The public doesn't seem to agree. When pollsters ask them which public institution they trust most, the answer is consistently the ABC in percentages as high as 85%. Faced with this fact, recent governments have sought to weaken the institution in less direct ways — usually by attacking its independence through budget cuts and Charter revisions. The real agenda of the present Government might be discerned from a leaked Department of Communications cabinet document ominously declaring that the Government must "influence future ABC functions and activities more directly."

In 1996, the Government commissioned a review of the ABC, giving the task to Mr. Bob Mansfield, a businessman with no background in broadcasting. The study was hamstrung at the outset by several "terms of reference" imposed by the Government, including an overriding requirement that a "savings target" be reached. The ensuing report, released in January 1997 and entitled *The Challenge of a Better ABC*, while professing to support most of the ABC's goals and activities, suggested changes in funding and approach that, in many cases, would make them either more difficult or impossible to attain. But its findings and recommendations regarding RA were even more uninformed and disastrous.

The Mansfield Report found — erroneously — that shortwave was a dying medium which had lost its effectiveness, that RA's audience was shrinking rapidly and that there was no real need for Australia to have an international voice because the BBC and VOA already served the region's audiences. Consequently, it recommended an end to the Charter requirement that the ABC broadcast programs to audiences outside Australia, leaving the decision as to whether to have international services at the discretion of the ABC.

The Report, anticipating the closure of **Radio Australia** and **Australia Television** (which was

later privatized), recommended that the net savings realized be applied to the savings target. A subsequent Australian Senate inquiry into **Radio Australia** and **Australia Television**, assessing their effects on international relations and trade, sharply disagreed with many of the findings and conclusions of the Mansfield Report.

The ABC chose not to close RA once the Government agreed to provide some funding for services to the Pacific. However, RA's budget and staff were halved and the Government, citing the Mansfield Report's erroneous finding that there were few listeners in Asia, closed down the Darwin shortwave transmitting facility. RA also ceased to be an independent entity within the ABC and its operation and management were joined with other ABC national broadcast services.

[For further information, use the Internet to locate the organization, Friends of the ABC, at <<http://www.iaccess.com.au/customers/fabc/fabc.htm>>; the Australian Department of Communications at <<http://www.dcita.gov.au>>; and the Australian Broadcasting Corporation at <<http://www.abc.net.au>>.]

identity.

"The other aspect was to prove to the ABC that, although we no longer have any short-wave capacity to Asia, we can reach audiences. So we are following a strategy of relays and rebroadcasts ... We haven't recovered the audience that we lost [but] we have secured and are delivering an audience which is, in some ways, different than the one we used to have before.

"We have proved to our media organization that we can deliver an audience. And it's important. It is not unlike the way commercial operators work where it's a matter of delivering an audience to the sponsors.

"The ABC has decided that its future is in the provision of quality material — good, credible, solid information and education. For our part we have set aside some resources and a team of producers to work on educational material with a local university ... By securing the relays with programs of general interest, we have opened some windows of opportunity where some of this educational material might be offered later on. So, in this regard, we are serving the interests of the broader ABC and because of this we are of value to it and therefore we justify our funding."

MT - In light of these necessary changes, is it still possible for RA and the ABC to retain a strong commitment to public service broadcasting values?



Roger Broadbent, RA's English Service Coordinator, programs the next few hours' output at the station's fully digital control center. Far from the days of the bustling radio control room and studio, these facilities today are rather sedate by comparison. A computer automatically insert the correct prerecorded programs and "bridges" at the preselected times. Roger's is the voice you hear on most of those "bridges." He is also the producer and host of Feedback.



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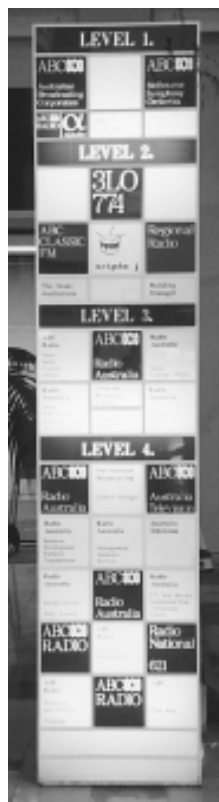
Mr. Manguy - "I think there is still a very strong commitment. When we talk of public service broadcasting we talk about values of integrity, of honesty, of objectivity, of balance and of quality material ... We are providing a service of a standard which is very much a hallmark of public broadcasting ... We are not delivering an audience to somebody else. We are securing an audience for ourselves. If there are some returns that come back to us which help fund some of these production costs, it's fine. But it's not produced for the sake of generating money for somebody else ... This is far from commercial considerations.

"There's not that much money in radio, as you know. There's not that much money to be made in selling radio programs. It's TV that's the revenue producer. If there is through radio an awareness of the ABC as a media organization which delivers content of quality, it's just another step to 'What do they have on TV?' That is the reality of the world we live in."

MT - One can recall **RA** receiving severe criticism from some quarters of the Australian Government for broadcasting information critical of the Indonesian government into Indonesia. Would it be fair for someone to draw a conclusion that **RA**'s Darwin transmitters were closed for political or diplomatic reasons and not for sound policy reasons?

Mr. Manguy - "...Many have wondered if the cuts were not dictated by political or diplomatic considerations and we ourselves wondered. I don't think that this is the case. I think **RA** was the victim of budget cuts which went right across the public sector here in Australia as a result of a particular economic policy. And, as a result of of the tense relationship between the Australian government and the ABC, I think we were probably to some extent the victim of that..."

"Once that decision was made, justifications for it had to be found and, frankly, with little raw data to the contrary, it was an easy one to make. It is very expensive, you know ... In the present [economic] climate, the government wanted ... immediate results. It's not



RA shares Southbank Centre with other ABC networks and stations as well as the Melbourne Symphony Orchestra

unusual — it's the way the Western world presently operates.

"But it is refreshing for us to hear from Australian business circles who should know about results and who say you need to make friends first and then business second. Whereas I think there is a perception in certain [government] circles in Australia that you need to do business pretty quickly to justify and maximize your resources.

"What we are saying, of course, is that what is being spent on **RA** is very little compared to the climate of good will it creates. But, obviously, it is not a perception shared by everyone."

MT - Is part of **RA**'s constituency the Australian people? Did these cuts happen partly because the Australian people were not aware of **RA** and, hence, there was no constituency within Australia to fight for it?

Mr. Manguy - "Indeed, and that is one of the issues we identified early on — the need for us to build a constituency for **RA** here in Australia ... There is a need for us to lift our profile here within Australia. Last Friday we held a benefit concert [for Papua New

Guinea] and there is no doubt that there was some public relations value in that in terms of **RA** [being] interested, involved and concerned about what's happening in the Asia-Pacific region. We need to sell that idea to more Australians."

MT - Do you feel that **RA** has achieved a degree of stability?

Mr. Manguy - "We've received a commendation by the National Advisory Council, which is an advisory body reporting to the Board of the ABC congratulating us for the changes over the past twelve months and the ABC Board has congratulated us for initiatives we have taken concerning the disaster in Papua New Guinea. So there is a perception within the upper levels of the ABC that we are doing the right thing and that we have moved in new directions. We are not the organization we used to be.

"Our old motto, our old slogan which still appears on some of our banners says 'In

Touch with the World.' We like to think we're still in touch with the world, but certainly our new approach is more Asia and Pacific focused. We see our role not only as a matter of delivering information to Asia and the Pacific but to deliver programming to Australian audiences about Asia and the Pacific. That's one initiative we took. We now have a program (*Asia-Pacific*) on domestic radio. And we deliver information about this part of the world to North America, Europe and South Africa through other means of delivery."

MT - So the North American audience is still important to **RA**?

Mr. Manguy - "Indeed so. We reach you in North America on **WRN**, through **NPR** and **CBC**, and we are on the Internet 24 hours a day, as well as shortwave when reception is good. So there are four ways you can reach our content and certainly through the Internet

The Structure of ABC Radio

ABC Radio is made up of:

Local Services

- **Metropolitan Radio** stations in nine cities

- **Regional Radio** with 49 studios and outposts outside the cities

National Services

- **Radio National**, a specialist, spoken word network

- **Classic FM**, a network devoted to classical music and performances

- **Triple J**, an FM youth network which reaches nine cities and 36 regional centers

- **Parliamentary and News Network (PNN)**, which features live broadcasts of Parliament and **NewsRadio**, a continuous news service broadcast when Parliament is not sitting.

International Service

- **Radio Australia**, broadcasting primarily to the Asia-Pacific region, but also available worldwide, on shortwave, satellite, the Internet and local broadcast partners in English, Tok-Pisin, Indonesian, Khmer, Vietnamese and Mandarin Chinese.

Radio Australia is now managed as part of the National Networks Division of the ABC along with **Radio National**, **Triple J**, **Classic FM**, **PNN**, **Multimedia** (Internet services) and the domestic ABC television network.

Hearing RA in North America

On Shortwave: (Refer to *MT's Shortwave Guide* pages for frequencies targeting the Pacific. Reception in North America can be variable depending on propagation conditions, season, location and time of day.)

On Satellite: on **WRN One English to North America** (Refer to *MT's Satellite Radio Guide* pages.)

Local Broadcast Partners: On **WRN from NPR** (on participating NPR affiliates) at 0030-0100 local daily, 0430-0500 local Tuesday, 0630-0700 local Sunday. On **CBC Overnight** at 0230 and 0505 local daily.

Internet Audio: "live to air" 24 hours a day at <<http://www.abc.net.au/ra/abclive.ram>> and simulcast of **WRN One English to North America** at <<http://www.wrn.org/audio/wrn1usa.ram>> in *RealAudio*. Also available in *Netshow* and *Streamworks*.

we see North America as an important audience."

MT - Does **RA** still have a role explaining Australia to the world?

Mr. Manguy - "I would say that probably half

of our air time is used up by programs which are Australian programs. Now it doesn't mean that they are programs that we produce ourselves. We don't have the resources and that is a choice we had to make ...

"What you hear on **RA** about Australia comes from the **ABC** domestic networks ... We thought that it has a better quality to it. It's more genuine; it's the real thing. You feel Australia and we have programs such as 'Macca' with *Australia All Over*, plus there's *Australia Talks Back* every day and you hear Australians expressing their views. I think it gives you a fair appreciation of what they think. And to us this is the quality Australian content. Something which is rehashed loses much of its character and borders on propaganda and we are now too smart, I think, to cope with that. You have to appeal to people's intelligence."

MT - Does **Radio National** feel it's of value to have its programming on **RA**?

Mr. Manguy - "Yes, absolutely, because the **ABC** is a public organization funded by the government, but it's also a media organization which finds that it has to position itself and let people appreciate the quality of its material ... The **ABC** and the **ABC** domestic producers are very happy to know that, through the Internet in particular, they are around the world. And some of them are already starting to act on that and use the Internet to have interaction with people overseas."

MT - Will **RA** remain a 24-hour service or will it have to contract?

Mr. Manguy - "We are a 24-hour service insofar as we are on the air for 24 hours. Having said that, for four or five hours in the middle of the night we only have one journalist who does a five minute news on the hour. It's a very limited service for a few hours, but it is important that we maintain that 'presence' around the clock because, for example, when it's midnight here, it's morning the day before in New York."

MT - How do you see the future for **RA**? What is your vision of what **RA** will be?

Mr. Manguy - "We have stabilized ... There's [still] a lot of good talent [here]. Some of our previous managers are not managers anymore, but they have a lot of experience and we're very happy that they could stay on ... We are spending some of our resources on our Internet site."



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Another view inside Southbank Centre.

"In terms of radio content ... we are very modular ... This approach lends itself to a flexibility in use, whether for rebroadcast or for lifting audio files to be put on the Internet. These are packages like products on the shelf in the store for different customers, rather than trying to be everything to everyone at every hour of the day. We have a more focused approach. That's, I suppose, the major shift that's occurred...

"So our future has to begin, in the context of our organization, with delivering programming which nobody else delivers within the ABC or in Australia. We have to build that constituency in Australia, that legitimacy within our own organization first. We have to prove that we are special, we are unique. And, as well, deliver to particular audiences what we think they want. And we think that what we know best is Asia and the Pacific and ... education. These are the three areas where we are putting our resources.

"In terms of shortwave, we hope we can recover some shortwave capacity out of Darwin. It all depends on the government of the day here. In the Pacific we are going increasingly into relays, but we retain our shortwave capacity. Some of the Darwin transmitters have digital capacity so we hope that equipment doesn't disappear because it would be a great asset for the future.

"You can't just lock yourself into one particular technology. That's the lesson you can draw from what happened to us. We had already ventured into other delivery systems, but perhaps not enough. The decision that cut

our budget forced us, faster than we would have wanted, to be more focused on what we do and more flexible in the way we do it. We don't know what the future is in a way. You can't take the risk of locking yourself into a particular technology ... Through each delivery system you reach different audiences.

"...At this stage, I think that our future is secured. And I think we are well positioned should there be extra resources coming our way. We've reshaped, and if we regain some shortwave capacity, well, so much the better."

Other ABC Radio via Realaudio

Triple J: "live to air" 24 hours a day at <http://www.abc.net.au/triplej/audio/triplej.ram>.

NewsRadio: "live to air" 24 hours a day except when copyright restrictions prohibit at <http://www.abc.net.au/newsradio/newsradio.ram>.

An RA Program Sampler

Despite the continual challenges placed in its path, RA's programming has always excelled. As Network Manager Jean-Gabriel Manguy pointed out in our interview — and as underlined in conversations with English Service Executive Producer John Westland and English Service Coordinator Roger Broadbent — **RA** has fixed its own program production efforts on informing and educating, as well as informing and educating about, the Asia-Pacific region. Here are some prime examples of that product:

Asia-Pacific (*On sw: M-Th 0010; M-F 1005, 1105 & 1505; Sa 0430, 0830 & 1030. On WRN: M-F 0010 & 1605; Sa 0805.*) - Perhaps RA's flagship program, *Asia-Pacific* is a daily round-up of issues, events and opinions from the region that is home to half the world's population.

Pacific Beat (*On sw: Su-Th 1810, 1910 & 2010; M-F 0510*) - focuses in on the island nations which depend on the Pacific Ocean for their existence drawing on Australian based reporters and correspondents.

Money, Markets and the Economy (*On sw: Th 1530; Sa 0505; Su 0005, 0805, 1130 & 2130. On WRN: Th 1630; Su 0805.*) - a radio and online project presented by Monash University, **Radio Australia**, **Radio National** and ABC Online, this 13-part series is designed to help you make sense of the global economy.

Messrs. Manguy, Westland and Broadbent also emphasized that, while **RA** no longer has the resources to produce much in the way of programming about Australia, the domestic network **Radio National** has some excellent shows which are relayed by **RA** and provide direct, unfiltered access to Australians and their opinions, issues, culture and activities. These include:

Australia Talks Back (*M-F 0310 & 1705*) - The national daily talkback program.

Rural Reporter (*On sw: Sa 0330; Su 0730; W 2330; Th 2130. On WRN: W 1630.*) - Each week, the ABC's rural journalists from around the country report on the people and stories of rural and regional Australia.

Australia All Over (*Sa 1905-2300*) - Hosted by "Macca," this Australian Sunday morning radio institution celebrates traditional, rural Australian ideals and values with listeners calling in from inside and outside Australia.

Among the many other programs deserving of your attention are:

Feedback (*On sw: F 2105; Sa 0005, 0605; Su 0305. On WRN: Sa 1605.*) - Roger Broadbent reads listener mail and updates you on **RA** programs and transmission schedules.

Late Night Live (*On sw: M-Th 1205*) - Billed as a "chat show for thinking listeners", LNL features Aussie author and broadcaster Phillip Adams discussing politics, philosophy, culture and current events with his guests.

Innovations (*On sw: Su 0230, 0830; M 2330; Tu 2130. On WRN: Sa 1630*) - A showcase of Australian design, discoveries, invention, engineering and research skills.

Awaye (*On sw: M 0110; F 1605*) - Australia's only national indigenous arts and culture program produced and presented by Aboriginal broadcasters.

For a complete schedule of **RA** programs, write to Box 428G, Melbourne or visit the **RA** Internet site at <http://www.abc.net.au/ra>.

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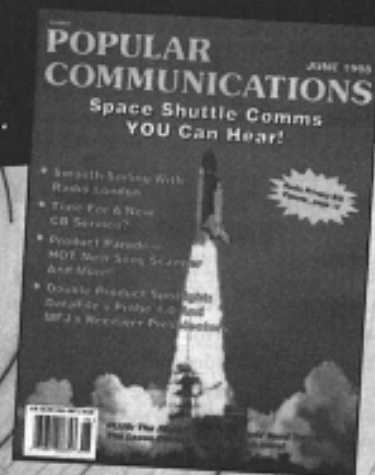
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A Lesson from Boston Police Radio

The Boston Police have opened their new Schroeder Plaza headquarters and dispatch center. The center is a marvel of the latest in dispatch technologies and is co-located with Boston EMS dispatch and operations. Boston Fire dispatch remains in a separate building, separate even from Boston Fire Headquarters (that's a story for another time).

Perhaps the best thing about the Boston Police, besides the fact that the crime rate in the city has been decreasing and it maintains a very safe downtown environment, is the fact that BPD continues to operate on 460 MHz UHF channels, almost entirely in the

clear (analog). Thirty plus years ago, the Boston Police operated on a single VHF-high band channel (159.210 MHz) for one-way broadcast (dispatcher to cars). The city then added a second channel for cars to talk back to the dispatcher (158.910 MHz). Today the BPD still continues to use these frequencies for paging and special events.

Sergeant John Doherty of the Boston Police Communications Unit recently told me that when he first came on the job the city maintained just two radio sites for those two channels. Today, the Boston Police has 55 radio sites for transmitters and satellite receivers, including many tunnel/subway trans-

ceiver locations. In fact, the new radio tower outside of the new police headquarters, which became part of the architectural design of the building, is rarely used. Its primary purpose is to provide a link to backup transceiver sites around the city in case of extreme emergency or breakdown of multiple transmit and receive locations.

After utilizing high-band for many years, the city finally upgraded to a 10-channel UHF system which makes up the core of the current channel plan. In the past five years, the Massachusetts cities of Cambridge and Worcester gave up their 460 MHz channels for a higher calling (470 MHz and 800 MHz



trunking, respectively). Boston scooped up these 460 MHz frequencies, added a few others, and today operates on sixteen 460 MHz channels, as well as a number of channels in the 453 MHz band.

As the Sergeant told me, the BPD has enough channel capacity and has no need to go trunking at this time. The Federal Communications Commission (FCC) will likely mandate that all users at the 460 band (and other bands as well) split their channels into 12.5 and 6.25 kHz increments eventually. This will give the city access to even more spectrum.

■ The Pros and Cons of Analog

There is one worrisome scenario which might eventually force Boston off of their robust analog system. With the widespread availability of VHF/UHF transceivers it isn't difficult for someone to program a radio with PL (private line tones), jump on the air, and start playing havoc with public safety communications. The Boston Police have actually heard civilians calling in for license checks using bogus unit identifiers.

How did the police know these weren't real officers calling in? It's simple, really. All mobiles and portables assigned to the system come with an automatic unit identification number that is transmitted when the microphone key is mashed. This is that quick burst of tones or squelch-sound that is heard right before the officer begins to speak. These unit identifier numbers show up on a dispatcher's CAD screen so they immediately know who is talking (it's the E-9-1-1 of public safety radio).

Without this automatic identifier, you're automatically spotted as someone breaking federal law and transmitting on a frequency without authorization. Can you be caught? Not easily. Can you still mess-around with a radio system? You sure can. Luckily, we understand that in Boston these incidents have been quite rare.

The Boston Police do use secure voice channels for certain investigative and command staff. While the city's Motorola radio equipment will soon all be digital-capable, there are no immediate plans for systemwide digital operation. Like many communities today, the city does use mobile data terminals (MDTs) in many of their cruisers, and lower priority calls are dispatched via this method.

While many scanner hobbyists have become apprehensive that all broadcasts will be sent via MDT in the future, it's a relatively unfounded concern. As we've discussed in previous issues, chases cannot be conducted

via MDTs, beat or walking officers don't use MDTs, and MDTs sometimes break down. Also, as the Sergeant related to me, since many MDT transmissions are sent to an individual unit, if one cruiser is assigned a call via MDT but a detective unit (obviously without an MDT in the car) or another unit who is close by the call never sees it, then response times will be longer than necessary. There will always be a place for voice traffic.

Sergeant Doherty also passed along an interesting story regarding those who might seek to eliminate analog voice traffic from the airwaves. When he first became a police officer, the Sergeant remembers the police were asking for a very much needed and long-awaited pay raise. Somehow the matter became a ballot question or public referendum of some sort (the details are a bit fuzzy). As Sgt. Doherty tells it, it was generally believed amongst the officers at the time that the reason the citizenry ultimately voted in favor of the pay increase was due in great part to the large population of city dwellers with scanners. Anyone who has listened to the operations of a police or sheriff department for any length of time inevitably comes away with a healthy respect of the job performed by these public servants. That undoubtedly was the case in Boston back many years ago and, even to this day, long-time officers still remember how the scanning public came through for them.

■ The BP signal, she ain't what she used to be

Another item I questioned the Sergeant about was the weakness of the signal on some of the Boston Police district channels. This author lives close to Boston and had always monitored the city "five-by-five." For the past 18 months or more, though, the signal has become markedly degraded. Districts 6 and 11 in South Boston and Dorchester don't propagate very well at all. Signals from other districts are also not as strong as they once were, although they're certainly readable anywhere in greater Boston. Was I crazy or was my equipment going out on me?

"Neither," the Sergeant responded. But something else very interesting has occurred: the city installed a new type of base-station antenna whose lobes of radiation spread the transmitted signal in a generally downward direction. Base-station dipoles usually reflect their signal out to the horizon, the Sergeant explained, which causes a great loss of RF energy to environs where it is not needed. The police department's transmitter site can cover a district easily enough, but

with the new antenna, the city also has superior in-building portable coverage. While we scannists outside Boston put up with scratchy signals, an officer on a foot-chase inside a downtown apartment-building garage can now be assured of constant connection with the dispatcher.

Note that the citywide Boston Police channels, such as channel one, provide incredible southeastern New England-wide coverage. The transmitter sites for citywide channels are atop some of the tallest buildings in the city and run at a healthy amount of power.

Here is the Boston Police channel plan, right up to the minute:

Boston Police: KCA860 - (PL 118.8 Hz unless noted)

MHz	Chan	Use
460.350	F1	City Emergency; Tactical; Special Events; Dignitary Protection; Central Artery Project Details
460.450	F2	Area "A" (Alpha) Operations*
460.225	F3	Area "B" (Bravo) Operations*
460.400	F4	Area "E" (Echo) Operations*
460.500	F5	Area "D" (Delta) Operations*
460.175	F6	Area "C" (Charlie) Operations*
460.300	F7	Car-to-car/Station to car
460.125	F8	Harry Base/Information requests
460.075	F9	Investigations (Victor)
460.250	F10	Detectives/Headquarters/Command
460.375	F11	Investigations (secure channel)
460.050	F12	Special Operations Division (SOD) (D-343)
460.150	F13	Investigations (secure channel)
460.275	F14	Investigations (secure channel)
460.475	F15	Command (secure channel)
460.025	F16	Radio Shop; Command Post; Emergency Services (barricade) unit BAPERN
	F17-22	BAPERN Regional and Emergency channels
471.0125	F23	Brookline Police (backup dispatch center)
XXXX	F24	Spare (can auto-select any channel - see below*)
453.350	F25	Housing Authority Police (Zebra) (D-351)

453.200 F26	Service (auto repair/maintenance)
453.300 F27	BHA & EDIC Maintenance
159.210R	Paging (154.890 input)
158.910R	Recruits; Special Events (154.860 input)
853.5625R	Mobile Data Terminals
851.4875R	Mobile Data Terminals
867.7875R	Mobile Data Terminals
Area "A"	Downtown/Waterfront/Beacon Hill East Boston/North End/Charlestown (Districts 1 and 7)
Area "B"	Mattapan/North Dorchester Roxbury/Mission Hill (Districts 2 and 3)
Area "C"	South Boston/Dorchester (Districts 6 and 11)
Area "D"	Back Bay/South End/Fenway Allston/Brighton/Kenmore Square (Districts 4 and 14)
Area "E"	Jamaica Plain/Hyde Park Roslindale/West Roxbury (Districts 5, 13 and 18)

* The consoles in the dispatch center are flexible enough to allow for frequencies to be randomly assigned to channel 24 and channels 28-36. Frequencies which may be selected include the MBTA Transit Police on 470.6625, Boston University Police, and any of the 800 MHz national calling and tactical channels as well as the State Police on their 800 MHz trunking radio system.

■ Morals about messing with the media

Early last fall, this author received a call from a television station in Boston. The station was readying a November sweeps news story on how people with baby monitors could have their conversations overheard by others with scanners. The station is well known in Boston for going from dead-last in its news ratings to first or sometimes a strong second. They accomplished this feat with their tabloid style of journalism.

When I received the call from the producer preparing the story, I immediately could picture in my mind just what this report would look like: the station would find some freaky-looking fellow hunkered over his scanners in his parent's basement as he tuned around looking for cordless phones, baby monitor or other nefarious frequencies. No sooner did the image come to mind than the station asked me if I knew of anyone who would agree to go on camera and do just what I had envisioned. The station also asked if I would go on camera with my own comments.

I came right back at the producer with my pointed answer. "The only way I'll participate is if you discuss the positive aspects of scanners — and, no, I don't know of anyone who would go on-camera and secretly tap into their neighbors." I did tell the producer that it was true, that with a scanner you could overhear conversations through nearby baby



monitors (up to about 1/8 of a mile or so). But you could also overhear the same conversations with another baby monitor. Scanners were not the culprit.

Fisher-Price's new line of baby monitors also include a voice-inversion technology and those concerned about eavesdropping now can take it upon themselves to protect their privacy (something this author has done himself). This didn't make for a compelling enough story, though. The station already had purchased a scanner and was ready to conduct their own demo — a scenario which was frightening in itself.

I eventually did go on camera to ensure that the station wouldn't find some freak to tap into his neighbors. I conducted a staged demonstration (as announced during the airing) with a neighbor where I took my scanner and tuned into this friend's baby monitor. The story aired during November sweeps. And then the you-know-what really hit the fan.

I was deluged with nasty, violent e-mail. The TV station had kept their word and ended the story about the positive uses of scanners. The news anchor related how neighborhood watch groups use the devices to stay abreast of crime in local communities. (They did *not* air any of my 30 minute dissertation on the other benefits of scanning, nor my talk about how the station itself uses scanners to gather the news on a daily basis). The people who were up in arms felt I had sold out the hobby. That I was trading a few minutes of fame for trash-talking about my own hobby and business. That wouldn't have made any sense, and naturally nothing could have been further from the truth.

When word got out that the station was almost certainly going ahead with the story with or without me, that it had viewers who had complained about being overheard, that they had their own scanner ready to conduct the demo, and that it was my intervention that got the positive aspects of the scanning discussed, then the online nastiness quickly died out.

Would I rather the station had never come up with the story idea? Of course. Was the station wrong to suggest that baby monitors can be overheard by neighbors with scanners? Of course not. With two young sons of my own I face the problem myself. Would it have been better had I just refused to participate? Perhaps. But I made a decision I still stand by. I felt that I had the opportunity to tell the other side of the story and to provide some balance, while at the same time insuring that some creep (and they are out there) didn't conduct the demo for the station.

What is the lesson here? The moral to this story is that the media, particularly television, is interested in doing stories that titillate. (You can imagine the Hitchcockian-promo that was aired for this story!) If they want to do a story about our hobby, chances are good that scanners will be painted with an evil face. If a station is hell-bent on doing an eavesdropping story, first try to talk them out of it. If that fails, make them provide assurances that there will be some balance to the story (it worked for me). But also be aware that you may be putting your reputation on the line and be prepared to take a good deal of heat.

■ Police Call 1999

The 1999 edition of *Police Call* is now available through Grove and all Radio Shack stores. As usual, *Police Call*, now well into its 30s, encompasses thousands of updates, corrections and new additions. The trunking section has been considerably beefed-up. Most of the nine volumes have tripled the amount of trunking information from 1998.

There was a hidden drama behind this year's edition, however, that made it somewhat touch-and-go whether we would go to press on time. Gene Hughes, the publisher of *Police Call*, had to undergo emergency heart surgery right in the middle of the book's production. Gene came through the surgery in good shape, but the pneumonia that followed really threw him for a loop.

Gene is fine now and appreciates all the good wishes from across the country. He is especially grateful for the kindness of the Los Angeles Police Department, for which he works as a volunteer.

Gene's publications have been essential to the growth of the scanner industry over the years. Without *Police Call*, there would have been no reliable resource for frequency information, particularly in the early days of the hobby. It's great that Gene's back and rarin' to go once again. Stay well, Gene.

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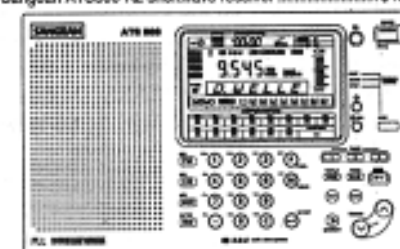
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Listen for USAF Salinas Global

As dedicated US Air Force listeners know by now, the Global High Frequency (GHFS) ground communication station at MacDill Air Force Base (AFB) in Florida shut down rather abruptly at 0000 Coordinated Universal Time (UTC) on July 1, 1998. This closure surprised a lot of people, as MacDill had seemingly been left out of military radio "rightsizing" plans as issued by the US Department of Defense (DoD).

Well, the other shoe has dropped. Even then, a little-seen "annex" to this master plan had provided for moving most of MacDill's communication assets to Puerto Rico in the Caribbean. In fact, this is what has happened. Government contracts show that, among other things, Rockwell/Collins is upgrading the existing Air Force HF radio site at Salinas, on the PR south coast.

Further, DoD Flight Information Publications ("Flip") dated after July 1 note that MacDill has been replaced by a new station, Salinas Global. It should have been on last summer, but nobody has reported hearing it. Either its automated transmitters are completely controlled from Andrews AFB, near Washington, DC, or the station is not up yet. We will have to keep listening.

Meanwhile, the GHFS mission has not changed since its creation on June 1, 1992. As stated in the Flip, it "provides... HF radio communications between ground agencies and US military aircraft for passing command and control information. Allied military and other aircraft are provided support in accordance with agreements and international protocols as appropriate."

In other words, you're liable to hear anyone on there. The US Navy is a big user, to the point where their own High Command (HICOM) nets have pretty much atrophied. Further, the four-letter calls beginning in "A," which always seem to confuse people, are pretty much all US Army vessels, or their control points. The Army has quite a few landing craft and barges that use GHFS.

The status of 10780 kHz also confuses people. It's listed as a GHFS backup, and one will hear DoD traffic there. Also, you'll hear frequent gurgling noises, of a sort associated with the military's Short Term Anti-Jam radio system.

However, 10780's primary use is by "Cape Radio" to work aircraft and ships on the Eastern Test Range. This range, which stretches far out to sea from Cape Canaveral, Florida, is used by the space shuttle and many other NASA and military launches.

Cape Radio is maintained by a private contractor at the Cape Canaveral Air Force Station. Actually, the powerful transmitters and large antennas are across the Banana River from the launch complexes. Their big signals are heard worldwide, as the range calls up ships and ARIA planes.

ARIA, by the way, stands for Advanced Range Instrumentation Aircraft. Home base is Edwards Air Force Base in California, but they



fly in support of Eastern Range operations as well. As noted in this month's logs, the secondary frequency of 20390 kHz is frequently assigned to all aircraft by Cape Radio. This, however, is not GHFS.

We've noted before that GHFS has a future, but not as GHFS. It's being incorporated, one stage at a time, into a huge, automated system that will ultimately control most Air Force ground radios over 1000 watts from Andrews. We can already hear a few link-establishment databursts around HF. We'll hear a lot more.

Meanwhile, here's the entire schedule for the Global HF System, as updated in July 1998. The widely varying guard times on some bands are due to daily and seasonal propagation changes. When in doubt, park your receiver on 11175 kHz, which is the busiest. Good hunting!

Global High Frequency System Schedule

H24: Continuous
S: Summer (April-September)
W: Winter (October-March)

Freq (kHz)	Station	Guard Times (UTC)
4724	Andersen	(S 1300-2000, W 1200-2030)
	Andrews	(S 0430-0930, W 0200-1230)
	Croughton	(S 2230-0400, W 1800-0800)
	Elmendorf	(S 1000-1300, W 0230-1900)
	Hickam	(S 0900-1600, W 0800-1700)
	Incirlik	(H24)
	McClellan	(S 0730-1300, W 0500-1530)
	Offutt	(S 0600-1100, W 0300-1400)
	Salinas	(S 0300-1000, W 0200-1100)
	Thule	(W only H24)
	Yokota	(S 1200-1930, W 0930-2200)
	Andrews	(S 0230-0930, W 2400-1230)
	Croughton	(S 2230-0400, W 1800-0800)
	Andersen	(S 1100-2000, W 1000-2030)
6712	Ascension	(1900-2400)
	Elmendorf	(S 0800-1400, W 0030-2130)
	Hickam	(S 0700-1600, W 0600-1700)
	Incirlik	(H24)
	McClellan	(S 0530-1300, S 0300-1530)
	Offutt	(S 0400-1100, W 0100-1400)
	Salinas	(S 0100-1000, W 2400-1100)
	Thule	(W only H24)
	Yokota	(S 1000-2130, W 0730-2400)
	This frequency has been removed from GHFS service	
6739	Andersen	(H24)
	Andrews	(H24)
	Ascension	(H24)
	Croughton	(H24)
	Elmendorf	(H24)
	Hickam	(H24)
8968	McClellan	(H24)
	Andersen	(H24)
	Andrews	(H24)
	Ascension	(H24)
	Croughton	(H24)
	Elmendorf	(H24)
8992	Hickam	(H24)
	McClellan	(H24)
	Andersen	(H24)
	Andrews	(H24)
	Ascension	(H24)
	Croughton	(H24)



	Offutt	(H24)
	Salinas	(H24)
	Thule	(H24)
	Yokota	(H24)
10780	AF Eastern Test Range (Backup for Ascension)	
	Antigua	
	Ascension	
	Cape Canaveral	
	Maui	
11175	Andersen	(H24)
	Andrews	(H24)
	Ascension	(H24)
	Croughton	(H24)
	Elmendorf	(H24)
	Hickam	(H24)
	Incirlik	(H24)
	McClellan	(H24)
	Offutt	(H24)
	Salinas	(H24)
	Thule	(H24)
	Yokota	(H24)
13200	Andersen	(S 2000-1300, W 2030-1200)
	Andrews	(S 0930-0430, W 1230-2400)
	Croughton	(S 0400-2230, W 0800-1800)
	Elmendorf	(S 1300-1000, W 1900-0230)
	Hickam	(S 1600-0900, W 1700-0800)
	McClellan	(S 1300-0730, W 1530-0500)
	Offutt	(S 1100-0600, W 1400-0300)
	Salinas	(S 1000-0300, W 1100-0200)
	Thule	(H24)
	Yokota	(S 1930-1200, W 2200-0930)
15016	Andersen	(S 2000-1100, W 2030-1000)
	Andrews	(S 0930-0230, W 1230-2400)
	Ascension	(0700-1900)
	Croughton	(S 0400-2230, W 0800-1800)
	Elmendorf	(S 1400-0800, W 2130-0030)
	Hickam	(S 1600-0700, W 1700-0600)
	Incirlik	(H24)
	Lajes	(H24)
	McClellan	(S 1300-0530, W 1530-0300)
	Offutt	(S 1100-0400, W 1400-0100)
	Salinas	(S 1000-0100, W 1100-2400)
	Thule	(S only H24)
	Yokota	(S 2130-1000, W 2400-0730)
17976	This frequency has been removed from GHFS service	

GHFS Ground Stations

ANDERSEN	Andersen AFB, Guam, near Agana
ANDREWS	Andrews AFB, Camp Springs, Maryland, near Washington, DC
ASCENSION	Ascension Island Auxiliary Air Base, Ascension Island (1)
CROUGHTON	Croughton Air Base, England, United Kingdom
ELMENDORF	Elmendorf AFB, Alaska, near Anchorage
HICKAM	Hickam AFB, Hawaii, near Honolulu/Pearl Harbor
INCIRLIK	Incirlik AB, Turkey
LAJES	Lajes Air Base, Azores (2)
MCCLELLAN	McClellan AFB, near Sacramento (3)
OFFUTT	Offutt AFB, near Omaha
SALINAS	Salinas Global, Puerto Rico
THULE	Thule Air Base, Greenland
YOKOTA	Yokota Air Base, Japan

■ Notes:

1. Ascension is located in the South Atlantic Ocean
2. Lajes is located in the North Atlantic Ocean
3. McClellan AFB, in northern California, is slated for closure. Therefore the station has begun to appear as "West Coast" and "Sacramento" in plans.

Abbreviations used in this column

53WRS	US Air Force Reserve 53rd Weather Recon Squadron	MARS	Military Affiliate Radio System, US
AFB	Air Force Base	MFA	Ministry of Foreign Affairs
AFN	AFN Armed Forces Network	MHz	Megahertz
AM	Amplitude Modulation	NARACS	National Radio Communications System
ARQ	Synchronous transmission and automatic repetition teleprinter system	NHC	National Hurricane Center, Miami, FL
ARQ-E3	Single channel automatic repetition teleprinting system	Ops	Operations
CAP	Civil Air Patrol	RSA	Republic of South Africa
CIA	US Central Intelligence Agency	STS	Space Transportation System ("space shuttle")
CP	Command post	RTTY	Radio Teletype
CW	Morse code telegraphy ("Continuous Wave")	SAM	Special Air Mission, US Air Force VIP flight
DE	CW procedural signal: "from"	SESEF	Ship Electronic Systems Evaluation Facility
DEA	US Drug Enforcement Agency	SHARES	Shared Resources, US government traffic network
EAM	Emergency Action Message	UHF	Ultra High Frequency, 300-3000 MHz
FAPSI	Federal Agency for Government Communications & Information (Russian)	Unid	Unidirectional
FEC	Forward Error Correcting teleprinter system	US	United States
FEC-A	One-way traffic FEC teleprinter system	V, VVV	CW signal: "testing"
FEMA	US Federal Emergency Management Agency	VIP	Very Important Person
JSTARS	Joint Surveillance Target Attack Radar System		

All transmissions are USB (upper sideband) unless otherwise indicated. All frequencies are in kHz (kilohertz) and all times are UTC (Coordinated Universal Time).

- 380.0 Unid-Aviation weather for Massachusetts in AM, possibly an old-style locator/weather beacon, at 1640. (Dean Burgess-MA) *FAA shows Boston on 382.* -Hugh
- 2670.0 Coast Guard Woods Hole-US Coast Guard, MA, requesting current status from sailing vessel *Broadsail*, at 0003. (Ron Perron-MD)
- 3245.0 Unid-Spanish Female with 5-number groups, "Atencion" format but ended with unfamiliar word sounding like "Delard," at 0233. (Gary Neal-TX) *Distorted Spanish "Final?"* -Hugh
- 3476.0 Gander-Gander Radio, taking position checks from aircraft American 174 and Italia 651 on North Atlantic route, at 0405. (Dean Burgess-MA)
- 4214.0 ZRH/ZSC-Cape Town Naval Radio, RSA, with maritime warnings, including one regarding a lost fishing boat, in FEC at 1019. (Bob Hall-RSA)
- 4278.5 AFN-American Forces Network, continuing rebroadcast from US Navy, Saddlebunch Key, FL, parallel on 6458.5, at 0840. (Robert Rabe-AZ) *[US Navy has been retransmitting AFN downlinks over HF from comm station NAR, FL, to temporarily fill a hole in satellite coverage during some Atlantic exercises. Unexpectedly, it's still going strong in December.* -Hugh]
- 4285.0 HPP-Panama, with CW marker, also on 8590, at 0555. (Cam Castillo-Panama)
- 4469.0 Florida CAP 373-Civil Air Patrol, net control with several southeast region stations, alerting them to severe weather in southern FL. (Perron-MD)
- 4770.0 Unid-North Korean female "numbers" voice, powerful AM signal, also heard various days on 5715, 5872, and 5873 kHz, all at 1400. (Takashi Yamaguchi-Japan)
- 5154.0 C, F, S-Russian Navy single-letter CW channel markers, Moscow, Vladivostok, and Alkhgansk, at 1754. (Yamaguchi-Japan) *Wow! Could the "cluster beacons" be back?* -Hugh
- 5277.0 Panther-Joint US Customs/DEA, Bahamas, working Hunter 08 (British Nimrod) and US Coast Guard aircraft 35 Foxtroat in drug interdiction net, at 0110. (Perron-MD)
- 5616.0 Quid 71-First in US Air Force flight of 3 (71-73), also Slip 81 (flight of 5, 81-85), Slip 71 (flight of ?), Slip 91 (flight of ?), Trin 22, Shuck 91 (flight of 4, 91-94), and Reach 127P, all on civil air route channel, enroute to Iraq buildup, starting at 2251. (Oscar Bosman-Netherlands) *These Slip flights were most likely B-1s. Trin 22 was an E-8 JSTARS. Shucks are E-3s.* -Hugh
- 5841.0 52 Alpha-US Coast Guard aircraft working Panther (DEA, Bahamas), at 2351. (Perron-MD)
- 6285.0 Unid-Cuban "Atencion" numbers, female voice with 5-number groups in Spanish, at 0304. (Castillo-Panama)



- 6382.2 EAD 2/3-Madrid Radio, Spain, with CW channel marker at 1303. (Castillo-Panama)
- 6458.5 AFN, rebroadcast by US Navy, Saddlebunch Key, FL, with sports talk show, at 0750. (Rabe-AZ)
- 6491.5 JOS-Nagasaki Radio, Japan, with CW channel marker at 1135. (Castillo-Panama)
- 6513.0 HLS-Seoul Radio, with melody mirror between phone calls, at 2230. (Yamaguchi-Japan) The music is a fairly decent computer rendition of Beethoven's "Ode to Joy." Serenades L.A. on a good day. -Hugh
- 6577.0 New York-NY Radio, taking position report from aircraft ADB007F, at 0154. (Burgess-MA) *East Caribbean air route -Hugh*
- 6628.0 Blue 29-Aircraft giving position to civil ATC as 44 North, 20 West, [North Atlantic -Hugh] then reporting, "We have our party in trail," at 0015. (Bosman-Netherlands)
- 6658.0 MIW 2-Mossad, Israel, repeated callup for over an hour, no message, starting, at 1415. (Yamaguchi-Japan)
- 6683.0 SAM 203-US Air Force Special Air Mission (VIP), on ground and setting up comm with Andrews at 0342. (Jeff Haverlah-TX)
- 6694.0 *Preserver*-Canadian Forces warship, in radio checks with Halifax and Trenton Military, at 0436. Canadian Rescue 400, aircraft in patch through Halifax Military to Halifax Rescue Coordination Center, at 1540. (Perron-MD)
- 6712.0 Circus Vert-French Air Force, Villacoublay, working unid aircraft, at 0631. (Perron-MD)
- 6739.0 Shuck 94-US Air Force, enroute to Europe, at 2347. Gold 12-US Air Force, patch to Moron for status of Gold 02 regarding rendezvous with Mazda flight 51 through 56, also using UHF 314.5 and 311.0 MHz, at 2355. (Bosman-Netherlands) *Gold and Mazda are "Coronet" callsigns used by military aircraft enroute across the Atlantic. More activity related to the Iraq buildup -Hugh*
- 6761.0 Moose 60- told by unid aircraft to contact CP on 11175. (Perron-MD)
- 6768.5 Unid-CW 5-letter groups, parallel on 6774.46, 6817.36, 6825.37, and 6833.45, at 0824. (Rabe-AZ)
- 6835.0 Unid-CW numbers station with callup, then 3-figure groups, at 1700. (Ary Boender-Netherlands)
- 6983.0 Unid-Cuban "Atencion" numbers, female voice in Spanish, abrupt cut during message, at 1142. (Castillo-Panama)
- 7039.0 C, F, P, S-Russian Navy single-letter CW channel markers, Moscow, Vladivostok, Kaliningrad, and Alkhagensk, all four heard simultaneously, at 1754. (Yamaguchi-Japan)
- 7078.5 L9CC-Unknown 40-meter intruder with CW marker "V CP12 DE L9CC," at 1850. (Yamaguchi-Japan)
- 7535.0 SESEF Norfolk-US Navy, testing all HF modes with *USS Gunston Hall* (LSD-44, VA), at 1309. (Perron-MD)
- 7918.0 Unid-English female voice, in AM, saying, "Message, message, message, group 3, group 3," then 5-letter groups, then, "End, out - end of transmission," at 0214. (Burgess-MA)
- 8125.0 KLB 48-National Radio Communication System (NARACS), IN, calling KLO 87 at 1139. (Perron-MD)
- 8375.0 Unid-Strong AM numbers broadcast in Chinese, at 1400. (Yamaguchi-Japan)
- 8861.0 Yakutsk-Russian aviation weather, at 1515. (Yamaguchi-Japan)
- 8906.0 Reach Victor 9-US Air Force Air Mobility Command, reporting destination of Santiago, Chile to Santa Maria air traffic control, at 0137. (Perron-MD)
- 8992.0 Alpha Charlie Echo 3-Aircraft working Portuguese Air Force ground station, at 0102. Auto Sale-US Strategic Command, passing 30-character EAM to Nightwatch (airborne CP) at 1524. Waterbug 770-US Navy P-3C in patch via Andrews Global to Jacksonville, FL, Naval Air Station regarding arrival, at 1735. (Perron-MD) Navy COD24-US Navy, enroute to Iraq buildup, with patches at 2304. (Bosman-Netherlands)
- 10352.0 VLB 2-Mossad, Israel, just repeated callup for over two hours, in AM and parallel on 12747, at 1845. (Yamaguchi-Japan)
- 10424.0 Unid-Female AM numbers voice with 3/2 figure groups, at 2226. (Burgess-MA) *I suspect the CIA Counter, though it usually uses 10423 -Hugh*
- 10780.0 King 29-US Air Force HC-130, with patch through Cape Radio to Canadian Forces Shearwater Ops for arrival arrangements, at 1932. Cape Radio-US Air Force Cape Canaveral AF Station, working US Coast Guard Cutter *Mohawk* arranging fuel at Patrick for helo Coast Guard 6530 after STS-88 space shuttle launch, secondary frequency of 20390, at 2031. (Stern-FL)
- 10872.0 C, E, F, S-Russian Navy single-letter CW channel markers, same places as other loggings, except "E" is unknown, all four simultaneously, at 1218. (Yamaguchi-Japan)
- 11175.0 Shuck 91-US Air Force, asking ground to have four aircraft meet them on UHF 282.05 MHz. MF 511-US Navy, patch to duty office, reported 75 miles out of Souda at 1237. Kate 51-US Air Force, with rare SKYBIRD message, at 1248. Reach 7027-US Air Force, Air Mobility Command, patch to Hilda (AMC control center), for weather at Sigonella, Italy, at 1313. Reach 21-AMC, patch to CP at Diego Garcia, inbound with 50,000 pounds cargo and 24 passengers, at 1756. Trin 22 [E-8C JSTARS -Hugh]-Patch to Raymond 19 [Air Combat Command, Robins AFB, GA -Hugh], with relay to Razor 01, Dragon 03, and Dragon Ops, at 2343. (Bosman-Netherlands) Andrews-Andrews Global, operator stumbling over very long EAM, after which their new radios did a common quirk of leaving the mike open, for operator's "whew," at 1543. (Haverlah-TX)
- 11178.0 PEMMA-Dutch Navy, working PJK, Curacao, and PJX, reporting departure from Grand Cayman Island, at 1328. Dutch Navy 361 passing position to PJK in Dutch, at 2055. (Perron-MD)
- 11220.0 SAM 204-US Air Force Special Air Mission (VIP), trying to resolve crypto problems with Andrews, frequency confirmed as Foxtrot-311, at 1940. (Perron-MD)
- 11232.0 Trenton Military-Canadian Forces, making patch from Bingo 419 to Bagotville Air Base Operations, at 1941. Saint John's Military, making patch from Razor 24 (E-8C JSTARS) to Raymond 19 (ACC, GA), with message for Dragon Operations, at 2054. (Perron-MD)
- 11309.0 New York-NY Radio, taking positions from Iberia 6071 and Europa 1189A, at 1650. (Burgess-MA)
- 11565.0 EZI-Abnormal Mossad "numbers" broadcast, with "ART 2" callup playing in background of usual "EZI" schedule, probably different transmitter because parallel of 9130 sounded normal. Somebody goofed? Started at 1900. (Yamaguchi-Japan)
- 12601.5 OXZ-Lyngby Radio, Denmark, with very loud CW identification in Sitor sync burst, covering Lincolnshire Poacher on 12603, at 1900. (Yamaguchi-Japan)
- 13200.0 Fairchild Dispatch-US military, telling someone that aircraft 17702 would need parking for maintenance, at 1513. (Rabe-AZ) Evac 4 Juliet 1-US military, enroute from Texas, with patch through Offutt Global to arrival site at Howard AFB, Panama. Asked doctor's permission to give saline solution to a sick passenger, granted, at 1739. (Allan Stern-FL) Evac 4J1, with patch through Offutt to Furious (AMC, Howard AFB Airlift Control Center), at 1750. (Perron-MD) Relief 474-US Air Force Reserve "hurricane hunter" on Honduran relief duty, enroute from Keesler AFB, MS, to La Ceiba, Honduras, made patch through Offutt Global to "Miami," then passed three coded weather observations, at 1822. (Stern-FL) [Allan confirms this aircraft as a TEAL C-130 #50966 from Keesler's 403W/53WRS. They were ferrying supplies to the Mitch areas and taking data for NHC, Miami, along the way -Hugh]
- 13528.0 C, F, P, S-Russian Navy CW single-letter channel markers, all four heard simultaneously, at 1400. (Yamaguchi-Japan)
- 14396.5 WUG 3-US Army Corps of Engineers, MS, SHARES net control with WGY 912 (FEMA Special Facility, Berryville, VA), WGY 911 (FEMA, MA), Yosemite 513 and 723 (Civil Air Patrol, CA), and many MARS stations. Control passed to SHARES Central Coordinating Station AFA3HY, at 1642. (Perron-MD)
- 14686.0 Atlas-US Customs, TX, taking patch from aircraft 311 at 1404.
- 14867.0 Possibly Egyptian MFA, Cairo, with very long Arabic messages to all embassies at the height of the Iraq crisis, ARQ at 1610. (Hall-RSA)
- 15016.0 Reach 024-Air Mobility Command C-141 with patch to Moron CP, later departed for Europe with 24 passengers, heard first at 1809. (Bosman-Netherlands)
- 16129.0 M4W-Israeli intelligence, RTTY with FAPSI, Moscow, on 16247, at 0826. (Boender-Netherlands)
- 16247.0 RK2-FAPSI, Russian Intelligence, Moscow, RTTY with Israeli intelligence on 16129, at 0829. (Boender-Netherlands)
- 16260.0 RFGW-MFA, Paris, France with coded traffic to embassies in FEC-A, simulkeying 18760, at 1702. (Hall-RSA)
- 17161.0 HLS-Seoul Radio, Korea, with melody mirror between patches, also similar on 17341 and 17350, at 0530. (Yamaguchi-Japan)
- 18012.0 Circus Vert-French Air Force, Villacoublay, working Circus Bonne, FAF Bordeaux, mentioned 11555 as a possible frequency, at 1533. (Perron-MD)
- 18760.0 RFGW-MFA, Paris, France with coded traffic to embassies in FEC-A, simulkeying 16260, at 1702. (Hall-RSA)
- 19131.0 Flint 931-US DEA aircraft, working Atlas (US Customs) enroute to Sundance 100 (DEA, South America), at 1510.
- 20048.0 L, S, P-Russian Navy single-letter channel markers, St. Petersburg, Alkhagensk, and Kaliningrad, his first hit ever for "L" any frequency, at 1555. (Yamaguchi-Japan) "L" used to be on 6804.5 -Hugh
- 22108.0 Unid-Cherry Ripe British numbers, Guam, parallel on 17499, at 0000. (Yamaguchi-Japan)



Who Uses What? Part 2

Table 1: Commonly Logged Frequencies in the US and Europe

HBD20/1	MFA Berne channel 1	9179 18269 18271 20610
HBD20/2	MFA Berne channel 2	7678 9174 13965 13976
HBD20/3	MFA Berne channel 3	7662 9166 10971 10973 16111 18268
HBD20/4	MFA Berne channel 4	16102 16113 16118 18269 20613
HBD20/5	MFA Berne channel 5	18269 18270 18284 20587 20609
		22967
HBD20/6	MFA Berne channel 6	7677 10953 10963
HBD20/7	MFA Berne channel 7	7677 13954 13958 13976 16102
		18285
HBD20/8	MFA Berne channel 8	13961 18258 20590 22963

■ Switzerland's Diplomatic Service

In our January column, we provided a helpful list of HF digital modes, and their likely users. Over the coming months, we'll profile many of these organizations in detail. Our hope is that armed with this information you'll be able to recognize the characteristics, frequencies, modes and operating habits of these stations.

Let's start with something that most listeners with modest decoding equipment will find easy to handle — the Ministry of Foreign Affairs (MFA) of Switzerland and its various embassies world-wide. MFA Berne, with its ITU callsign HBD20, has been an HF regular for some time now using standard SITOR-A ARQ, with well known frequencies and a reach which allows listeners worldwide to catch some of the action.

MFA Berne can be found on a variety of frequencies (see Table 1) sending messages (both plain text and encrypted five letter groups) to its embassies on any weekday and Saturday. Many messages, especially those encrypted, are very long, so be prepared to use your decoder's "capture to disk" feature so that you can analyze messages later.

■ How It Works

MFA Berne provides a mailbox-like system to which embassies can connect and automatically retrieve or be sent pending messages. The mailbox is activated using the normal SITOR-A ARQ selective calling (selcal) mechanism. MFA Berne responds to selcal KPVP, and all embassies respond to selcals beginning with BM. For example, Berne can call Embassy Brasilia with the selcal BMEQ, or Ottawa with BMRC.

Once connected, MFA Berne will respond with its callsign followed by the mailbox "channel" number (see Table 1), and messages will then follow. It's pretty easy to discover the sender and recipient of the messages since Berne is always identified as "berneda" and embassies names are always eight characters long with the last two characters "am" — for example, "tripolam" (Tripoli) or "belgraam" (Belgrade). At the end of the message, or messages, Berne or the initiating embassy will send its callsign (all embassies using their ITU callsign HBDxx).

Here's a typical example:

```
bmzy bmzy bmzy bmzy$ (Berne calls Brussels)
+? (Connected!)
hbd 20 /2 (Berne identifies)
04.12.1992 utc 1047 pm (Message follows)
(((( ((((( muro3578 edaa0712
ur bruxelam
.edaberna
```

zir00176

cszxc onijy rfoih ybwfy ijvxx oolxe fwoxe vfhtj ltbiv ovlvf yoybb irhhu boijy lnfyng nggxt inzne xibkn jmiwe nyywt
jvyj (and so on)

hbd 20/2

(End of message, and off-air)

■ Who else makes use of SITOR-A?

SITOR-A is very common, easily decoded and, as illustrated above, not just used by the amateur and marine sectors. In its most common form SITOR-A is a narrow band, 170 Hz, 100 baud signal identified by its characteristic chirping sound but over the years other forms of SITOR-A have appeared. These "other" SITOR-A forms take the shape of wider shifts, ranging from 300 Hz, 400 Hz and 850 Hz. The following table illustrates some of the users and shifts.

SITOR-A

User	Shift (Hz)
Amateur, Marine, Gov. Diplo	170
Spanish Air Force	300
Norwegian Navy	300
MOI Spain	400
Guardia Civil, Spain	400
Norwegian Navy	850

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"Anything Gone"

"Did you hear that the BBC's *Anything Goes* disappears after the start of the year?" asks William G. Martin of St. Louis, Missouri. "This comment was buried in the middle of the program in November via a comment by the presenter. No other announcement or notice appeared in print via *On Air*. Why are they doing that? As I wrote to *Write On*:

"It was mentioned within the program *Anything Goes*, as an aside in passing, that the program will disappear at the end of 1998. Why? It is another in the long-time standards of the World Service that is being given the ax unceremoniously and unheralded. Why is this program being eliminated? In your recent discussion of music on the World Service, your interview emphasized the difficulty of giving time to various esoteric and unusual types of music that have followings but for which there is little or no room in the tightly-packed WS schedule. *Anything Goes* is a perfect solution for this, providing a pathway to air at least bits of musical styles you cannot devote entire programs to. Why not keep it for that reason alone?" (William G. Martin, St. Louis, Missouri)

■ Save the BBC World Service!

Stokes Schwartz of Madison, Wisconsin, adds this: "I saw the news [regarding 'modernizers'] in the December edition of this column and am quite upset about it. Why must the baby be thrown out with the bathwater in order to please the Spice Girl crowd? I'm not a crusty old timer, but rather a 32-year-old faithful BBC WS listener for the last 15 years. Until very recently, I had extremely long hair, looked

every part the wild man, played loud guitar music in musical groups, and lived with my girlfriend.

"What concerns me is that the current and future WS management seem to want to do away with the main strength of their outlet, namely its vast variety. There are already a few shows which cater to the previously mentioned Spice Girl set such as *Mega Mix*, *Multi Track/Alternative*, etc. However, for the intellectually curious every other taste is offered something as well, whether religion, classical music, jazz, current affairs, literature, drama, science, broadcasting, etc. And, we already hear regional British accents on the WS — ever hear Andy Kershaw who presents his *World of Music* program? We also have a number of announcers who, by their names, or accents, either are not native English speakers or whose families immigrated to the UK at some point in the past. What planet is the BBC WS management living on?

"Is the all-news format another option? I am a news hound, but do enjoy a break from it periodically. Just listen to all news domestic stations in the US — pretty dull after three hours of the same 'breaking stories.' And CNN is a poor substitute!

"As to the so-called research which they point to as their motivation, well, as an academic (University of Wisconsin - Madison) I know all about how 'research' can be conducted or twisted to suit one's own ends.

"Of course, I am preaching to the converted! But, I am starting a petition campaign in North America to 'Save The World Service.' Contact rsschwar@students.wisc.edu" (Stokes Schwartz, Madison, Wisconsin)

BELGIUM [non] After more than six years of absence from the shortwave bands, RTBF, the public broadcaster of the French speaking part of Belgium, is relaunching a SW service. On 9 December 1998 a contract was signed between RTBF and Deutsche Telekom, about a series of test transmissions via the DTK station at Jülich near Köln. These tests will take place from 14 until 24 December 1998: 0600-0700 UT on 15715 kHz; 1100-1200 21540; 1700-1800 15715. All transmissions are beamed to Central Africa and will consist of one prerecorded programme in French (so the same programme will be broadcast 33 times). If successful, regular transmissions can start on 1st February 1999. Reception reports can be sent to: e-mail: Relint.r@rtbf.be - fax: +32 2 737.30.32 (Mr. Jean-Pol Heck) mail: M. Jean-Pol Heck, Directeur des Relations Internationales, RTBF, 1044 Bruxelles, Belgium (via Paul Brems, BC-DX)

BOTSWANA R. Botswana back on 3356 for first time in two years, 2127-2201* //4820, but 3356 missing the next afternoon; however, unusual to hear station on four frequencies at once, at 0243 with our favorite *watch-where-you-step* interval signal on 3356, 4820, 7255 and 6712 = 2 x 3356 (Bob Hill, MA, *The Four Winds*)

CANADA Frequency changes for RCI's *First Edition*, M-F 0600-0630: we continue to be on 6090, 6150 and 11905 and on two new frequencies 9670 and 9780 replacing old 9740 and 9760. It's probably the quickest and most dependable way of starting the day, informed and in touch with the latest developments in Canada. Web page on the RCI site can be found at: <http://www.rcinet.ca/en/program/emission/first.htm> The live stream at 0600 is on the first page of the RCI site at <http://www.rcinet.ca> As soon as we're off air, the program is archived for the next 24 hours (Wojtek Gwiazda, Host and Producer, rec.radio.shortwave Dec 9 via John Norfolk, OK)

*All times UTC; All frequencies kHz; * before hr = sign on, * after hr = sign off; // = parallel programming; + = continuing but not monitored; 2 x freq = 2nd harmonic; J-98=May-Sept; Z-98=Summer season; W or B-98=Winter season; [non] = Broadcast to or for the listed country, but not necessarily originating there.*

Reception from CBC Northern Quebec service on 9625 has been so poor for years that I was quite surprised to find a loud and clear signal during the 0500 hour, so the classical music on *That Time of Night* could even be enjoyed (gh)

CENTRAL AFRICAN REPUBLIC R. Minurca, operated by United Nations Mission in the CAR, to provide info to public prior to legislative elections due in early 1999; address P O Box 2732, Bangui or radmin@intnet.cf 24h in French/Sango/English on 9900; 0600-1600 on 9500, 1600-0600 on 5900; includes relay of BBC Africa Service M-F 0500-0600, 1745-1900 (BBC Monitoring) 9900 audible at 2300-2425 with pop music, dead air, presumed Minurca, splatter from 9905 after *0025 (Brian Alexander, PA, *WORLD OF RADIO*)

CHAD RNT can be heard during a brief break in RN-Bonaire transmission between 0425 and 0430 on 6165 (Randy Stewart, MO, *WORLD OF RADIO*)

CONGO Brazzaville, 5985, can be heard in clear during WYFR break at 0445-0455, but also mixing before and after (Randy Stewart, MO, *WORLD OF RADIO*)

COSTA RICA RFPI added *Chiapas Daily News*, M-F 2155, Tu-Sa 0555, 1355. *Pacifica Daily News* via Internet only at 0400-0430 Tu-Sa (no repeats allowed), so *Continent of Media* and *World of Radio* UT Sat shifted half an hour earlier; and repeats standardized to 8 hours apart: COM Fri 1900, Sat 0300, 1100; WOR Fri 1930, Sat 0330, 1130 on some of: 21460-USB, 15049, 6975 (RFPI *VISTA*)

ERITREA [non] Clandestines on 9230 which may be in Sudan: V. of Democratic Eritrea - The V. of the Eritrean Liberation Front Revolutionary Council (Arabic: *Sawt Eritrea al-Dimuqratiya - Sawtu Jabhat al-Tahrir al-Eritrea*); address ELF-RC, P O Box 200434, 53134 Bonn, Germany, 1500-1530 daily in Arabic/Tigrigna. V. of Free Eritrea (Arabic: *Sawt Eritrea al-Hurrah*; Tigrigna: *Demtsi Natsa Eritrea*) says it is mouthpiece of the Eritrean National Alliance, an umbrella organization includ-

ing the ELF, Eritrean Islamic Jihad and the ELF-National Council, all of which are opposed to the Eritrean government; M-F 1530-1600 in Arabic/Tigrigna. V. of Truth (Arabic: *Sawt al Haqq*) supports the Islamic Salvation Movement (*Harakat Hamas al-Islamiyah*), formerly the Eritrean Islamic Jihad Movement; goal is to overthrow current president of Eritrea and replace him with a Muslim: 1530-1600 Sat/Sun, 1600-1630 M-F in Arabic; 1600-1630 Sat/Sun Tigrigna (BBC Monitoring)

GUYANA We are off 5950 for the moment and are awaiting spares for the transmitter from New York. So we are using 3290 with 10 kW and a non-directional antenna 24 hours a day for Guyanese abroad, particularly in New York City. We relay BBC and VOA from midnight to 4 AM (0400-0800) daily, one station one day and the other the next (Roy Marshal, GBC, Nov 27 via Hans Johnson (c) *Cumbre DX*)

HUNGARY R. Budapest is first international SW broadcast station on the 11mb this cycle: 25700 at 1100-1300 Mon-Sat to Au, weakly heard here (Dave Kenny, England, *World Of Radio*)

INDONESIA Re the question of the song played by RRI Jakarta at the end of the news relay, it's *Bagimu Negeri* which roughly translates into *For Your Country*. It's one of the many national songs of Indonesia, like the national anthem *Indonesia Raya*, the *Pancasila-Song*, *Rayuan Pulau Kelapa* and others. If you want to listen to them, there is a website complete with midi-files and texts (in Indonesian): <http://www.geocities.com/SoHo/1823> or, alternatively <http://welcome.to/SongsIndonesia>. There are also many folk songs and pop songs available, together with links to other sites with Indonesian music (Gerhard Werdin, Bandung, DSWCI *DX Window*)

ITALY IRRS-Shortwave, Milan, operated by NEXUS-International Broadcasting Association, with UN Radio, UNESCO, religious and own programs in a number of languages, principally English, French, Russian, Spanish, German, Italian; 10 kW, reduced carrier USB: Daily 0600-0730 and 1800-2300 on 3985; Sat, Sun 0300-0600 on 7120, 0730-0830 on 3985, 0830-1300 on 7120 (BBC Monitoring)

JORDAN R. Jordan heard only irregularly on 11690, English 1100-1730 registered. It seems they have trouble with the 3rd SW transmitter, or even limitations in main power. In Sept/Oct/Nov 11690 missing totally some weeks (Wolfgang Büschel, Germany, *BCDX*)

LIBYA V. of Africa, English is at approx. 0135, 1135, 1735, 2035, 2335 on 11815, 15235, 15415, 15435 (British DX Club *Communication*)

MALAWI Spencer Ulbon of MBC's technical department says that they have a large fault with their 50 kW transmitter. It will be some months before it is back on either 3380 or 7130. They are only on at 0600-1600 on 5995 (nominal) right now with 10 kW (Hans Johnson - (c) *Cumbre DX* Nov 27)

MOLDOVA [non] Analysis of the horrible signal of R. Moldova [via Galbeni, Romania] reveals sharp spikes of hum at 50, 100, 150 and 200 Hz, which indicates faulty power supply regulation (Al Quaglieri, NY, *World Of Radio*)

NAMIBIA Joe Duwe of NBC says they started using the 49 mb more because of increased sunspots. The new channels are well heard. The Harris transmitters are running fine, usually just below their rated 100 kW, in order to save on the tubes, so figure about 90 kW output: 6060 at 0715-1700, 3270 at 1700-2000 in local languages. 6175 at 0715-1700, 3290 at 1700-2000 in German and Afrikaans. 3270 and 3290 both carry National Radio at 2000- 0715 (Hans Johnson- (c) *Cumbre DX* Nov 27)

NEPAL R. Nepal SW transmissions are all from the 100 kW Khumaltar site: 5005 all seasons, 3230 winter alternating with 7165 summer at: 0015-0615, 0715-1715 (Sat 0015-1715) (Manosij Guha, DSWCI *DX Window*) But "summer" 7164.4 was still going in December at 0120 (Karl van Rooy, Netherlands, DSWCI *DX Window*)

NETHERLANDS [non] *DX Jukebox* returns! Dick Speekman, Adelaide, SA, advises that the last program he produced for Radio Netherlands was in March 1979. It's now available on <http://home.clara.net/dkernick> Dick says that "...old broadcasts never died, they just faded away on the shortwaves. It is different with cyberspace. However, if nostalgia is your thing and you wish to hear the last *DXJB* I made for Radio Netherlands it is yours for the click of a button." (*Electronic DX Press*)

NIGERIA [non] Joe Brashier tells *Cumbre DX* that LeSea broadcasting canceled the contract of the various Nigerian programs they were carrying (i.e. Ogene Ndigbo Radio, Voice of Oduduwa) on WHRA in October. Wow, how is that for the rapid rise and fall of the Nigerian clandestines?! The above via WHRA never had a chance, trying to pay for airtime by asking for donations. Perhaps they will come back elsewhere, but they won't last long anywhere until they get proper financing—the problem that has plagued many a Nigerian operation. We have now gone from seven stations/programs just a few months ago to just one—Radio Kudirat, which apparently stays alive thanks to grant money. (Hans Johnson, *Cumbre DX*)

PERU 5898, R. Nueva Cajamarca, 2215-2320, new frequency ex- 5887.2. On 6520, R. Impacto, 1120-1130, new frequency ex-6674.8, excellent signal but problems with microphone, very slow sound. 6690.2, R. Estudio 3000, 0020-0040; canned

ID says "3000" but live IDs say "2000" (Rafael Rodríguez R., Bogotá, Colombia, *Mundo Radial*)

POLAND [non] 7400, R. Jasna Gora Relay via Russia, 5 December, *2000, After concluding R. Maryja relay, sign-on with church bells and elaborate fanfare followed by announcement by woman in Polish that included a casual *Tu Radio Jasna Gora* ID. Into religious vocal accompanied by organ. Strong, though somewhat choppy. This relay of a Polish FM station (100.6 MHz) is Saturdays only (Bob Hill, MA, DSWCI *DX Window*)

PORTUGAL On Nov 25th, DW (Deutsche Welle) and Portuguese ICP (Institute Communication Portugal) prolonged the Sines relay station contract for the coming sesquidecade till July 2014. Target of Sines relay is SWEu, NWAf as well as NAM during our night. This station is also attractive for interested broadcasters to exchange time on SW. Sines is used for RCI relays towards Russia, Ukraine and ME. Recent negotiations with V. of Russia under way, but no agreement signed yet.

The 28 year-old DW relay site will be modernized at a level of 14 mega DM. Three old 250 kW Marconis will be replaced by most modern cost- and electricity- saving types, which will allow automated procedures and digital mode transmissions. Six antiquated log-periodic and curtain arrays will be replaced by another [third] revolving curtain antenna. DW digital mode on SW Sines will start in 2001. Frequency usage will then be optimized and flexible, saving 1.8 mega DM estimated per year.

DW Sines relay site built up by late Gustav-Georg Thiele in 1969-1970, opened on Jun 3rd, 1970. The Marconi units were originally intended for the planned DW El Salvador relay site, which should be erected in 1967-1968, but never realized due to lack of permission by the local authorities (DW, Steffen Heinze via Walter Eibl, *BC-DX*)

RUSSIA Because of limited budget finance according to a new fiscal year budget, Radio Mayak will not be using any shortwave transmitters from January 1, 1999 (Mr. Pavlov, Chairman of OGRK "Radio Mayak," December 4 via Mikhail Timofeyev, St. Petersburg) Had been using from one to five SW transmitters at a time during almost every hour of the day. Real Audio available at <http://www.radiomayak.ru/> (BBC Monitoring)

R. Tatarstan, Kazan, via high-power SW in Samara, mostly in Tatar, but some Russian, one hour earlier in summer. 0500-0600 to Siberia/FE 15105; 0700-0800 Urals/Tyumen 6130; 0900-1000 Moscow/St. Petersburg 11915 (BBC Monitoring)

SA'UDI ARABIA BSKSA heard with a few minutes of English at 1600-1610* on 15170 (Sheldon Harvey, Quebec, *WORLD OF RADIO*) Supposed to turn off transmitter after French relay of domestic service ends at 1600, but a bit slow that day (gh)

SIERRA LEONE SLBS tells *Cumbre DX* they are off the air for the moment due to power shortages. They are using two 10 kW Continental transmitters, originally delivered in the 80's and refurbished in 1995. The Nigerian bombing raids during the unrest never hit the shortwave directly, but did hit the FM/TV facility. They planned to resume on this schedule: 3316 0600-1000, 1500-0000, 5980 1200-1500 (via Hans Johnson, (c) *Cumbre DX* Nov 27)

SPAIN REE announced that Terry Burgoyne, host of *Distance Unknown*, had retired (Pete Costello, NJ) He frequently quoted from *MT* and gave our address (gh)

SRI LANKA SLBC All Asia Service in English on 6005, 9730 and 15425 0030-0430 and 1230-1600. Main target is Western India where the oldies and C&W music is very popular amongst the Anglo Indian and Goan Christians, not to forget the state of Kerala which has a big Christian population. The service is also extremely popular in Burma/Myanmar (Victor Goonetilleke, Sri Lanka, UADX via DSWCI *DX Window*)

[non] IBC Tamil: Some controversy over this station, which has a Tamil bias in the ongoing ethnic war in Sri Lanka. Newspapers have been highlighting this

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station's anti-Sri Lankan stand, and getting airtime on DTK Jülich, which is seen as an unfriendly act by the German government while DW is played host to by Sri Lanka. The station claims to be run by ex-BBC personnel. How they get the money to run is also rather a mystery. Sked is 0000-0100 in Tamil, with English news at 0050-0055 on 7150 (Victor Goonetilleke, Sri Lanka, 4S7VK UADX, via NU, Nov 14 via BC-DX)

IBC Tamil is now using new 7460 for its 0000-0100 service. On UT Sunday they were in English already at 0040 tune in with long news report from a Tamil Tigers news station talking about the "brave fighters." English was at 0050 UT Monday when news report was all about military activity in the Tamil region but both the Tamil Tigers and the Sri Lankan government reports were quoted (Mike Barraclough, England, Dec 1, *Review Of International Broadcasting*) On both 7150 from Germany, 7460 from CIS. Programming, which I heard during 20 minutes of monitoring, was of a dreadfully dull and listener-hostile style: nothing but endless speech by alternating man and woman. It's for me hard to believe that former BBC employees could be such bunglers without any sense for lively radio broadcasts (Kai Ludwig, Germany)

SUDAN [non] V. of Freedom and Renewal, V. of the Sudan Alliance Forces, V. of the Popular Armed Uprising (Arabic: *idha'at al sawt al-hurriyah wa al-tajdid, sawt quwwat al-tahaluf al-sudaniyyah, sawt al-intifadah al-sha'biyyah al-musallahah*) first observed 7th May 1998. Sudan Alliance Forces (SAF) are an opposition guerrilla army of ex-government northern soldiers, affiliated to the Asmara, Eritrea-based National Democratic Alliance (NDA), the main opposition umbrella group whose URL is <http://www.safsudan.com> - daily on 7000v in Arabic at 1600-1700 and irregular at 0400-0500 (BBC Monitoring)

V. of Sudan, clandestine from Eritrea: Abdullahi El-Mahdi of the National Democratic Alliance says about his station: We have two daily broadcasts right now, 0400-0600 and 1600-1800 on 8000, 9025 (where it is often jammed by Sudan -HJ), 10000 (a new frequency), and 12000 kHz (nominal, usually on 12008 -HJ). Our programs are in Arabic and we do not have regular English broadcasts for the moment. You can visit our website at <http://www.visitweb.com/nda/> (via Hans Johnson- (c) *Cumbre DX* Nov 25)

THAILAND 6765-USB, Bangkok Meteorological R., Dec 5, 2244, Man in Thai till 2247, then jaunty theme that sounded like *Turkey in the Straw* played on a glass harmonica. ID in English followed by sked info and other announcements. Theme again at 2251 and back to Thai. This and // 8743-USB both rather weak but clear and stable (Bob Hill, MA, DSWCI *DX Window*)

For 8743.0-USB Bangkok Meteorological Radio, sent partly detailed letter (time missing) in 3 weeks, V/S Mr. Suparerk Tansirattana Wong, Director. Addr: Bangkok Meteorological Radio, Telecommunication Division, 4353 Sukhumvit Road, Bangna, Bangkok 10260, Thailand. Announcement gave sked of weather bulletins in English and Thai on 6765.1 // 8743 (ex-8208) at 0000-0200, 0300-0500, 0600-0800, 0900-1100, 1200-1300, 1500-1700, 1800-2000, 2100-2300. Between the wx bulletins a melody is heard. I would put this in the same category as the Turkish Met station (Harald Kuhl, Germany, via NU, via BC-DX)

TURKEY VOT planned to change 6010 to 9655 at 0400-0500 as of Feb 14 for English to Nam/Eu (TRT)

UGANDA According to the R. Uganda, their latest schedule is: 4976 at 0300-0600, 1300-2100; 7196 at 0600-1300 for the Red Channel, power is 10 kW. 5026 at 0300-0600, 1300-2100; 7110 0600-1300 for the Blue Channel, power is 10 kW (via Hans Johnson- (c) *Cumbre DX*) 4976, Radio Uganda noted from 1759 and building thru to 2100* with ID and short chorus (Don Moman, Alberta, Dec 1, *ibid.*)

UKRAINE RUI Kiev transmitter on 11825 at 0600-1500 to Zones 20 and 30, 100 kW, 74 degrees produced this morning some spurious signals in the 25 mb. Strong buzz every 42.5 kHz like a garden fence on 11783, 11741, 11700, 11658, 11616 kHz, and 11868, 11910, 11952, 11994 kHz (Wolfgang Büschel, Germany, BC-DX) R. Ukraine on 22260 = 3 x 7420 at 1325, moderate strength (Harald Kuhl, Germany, *Cumbre DX*) Look for lots more SWBC harmonics in the 22-31+ MHz range when the MUF is up! (gh)

UKoGBANI [non] Miss Janet Lee, the deputy head of programming and advertising at the Radio Authority, has been suspended from her job following her arrest and questioning by Scotland Yard Flying Squad detectives investigating allegations of bribery and corruption. Ms Lee has been released on police bail until the New Year. Also arrested, questioned and bailed was Dr Avtar Lit, the Chief Executive of Sunrise Radio. The focus of the police investigation is a two-week holiday Ms Lee took in India in 1966 and who paid for it. Ms Lee was reportedly accompanied on the trip by a director and shareholder of Sunrise Radio [which broadcasts on SW

via Germany]. (Ray Woodward, BDXC *Communication* via BC-DX)

UNITED NATIONS [non] It is not true that United Nations Radio will be offered free airtime by international broadcasters like Deutsche Welle, BBC or VOA. Maybe this will become reality sometime in the future, but for the time being it is nothing more than wishful thinking. This still would have to be negotiated between UN Radio and possible partners. Furthermore, DW is not at all involved in the deal between UN Radio and DTK Jülich, from where transmissions finally should start during December. It seems that the planned transmissions via Jülich can be seen as a first step — and an important one — for UN Radio on its way to get back on the air as a regular broadcaster rather than just providing tapes for rebroadcasting as they are currently doing. (Harald Kuhl, Germany, Nov 23, DSWCI *DX Window*) Do not expect regular transmissions coming from UN Radio to start before Jan/Feb 1999. Furthermore, Jülich no longer is the only possible site for them and a final decision which offer they will accept still has to be made. UN bureaucracy is slow (Harald Kuhl, Dec 9, *Cumbre DX*)

United Nations Radio has ceased operations as from 28 Oct 1998. The proposed Jülich (Germany) services never eventuated. UN is now concentrating on InterNet broadcasting. The status of "programs" listed for Bhutan and All India Radio is unclear (*Electronic DX Press* Dec 3) Well, UN news and features continued as usual on RFPI, at least (gh)

USA Jim Bass and *Let's Talk Radio* return December 21 on WBCQ worldwide shortwave 7415 Mon 0500-0800 and the Internet via live streaming audio via Radiomall at <http://www.radiomall.com/ram/letstalkradio.ram> (rec.radio.amateur.misc via John Norfolk)

From WWCR's December program sked posted on website: WWCR-1 15685, 1100-1200 Fri and Sat *Perspective on Iran* (Pe) [I assume meaning Persian language, altho missing from key at end] and 1100-1200 Tue same in (K) [presumably Kurdish!] (gh)

WRNO was trying to be sold through a silent auction, but no one bid the minimum so the auction ended and station is simply for sale. More details on the <http://www.gjainc.com> website (Hans Johnson, *Cumbre DX*)

Fundamental Broadcasting Network used to be on WGTG, but are no longer there after a falling out. According to Dave Frantz of WGTG via Glenn Hauser, they are planning on building their own station. Here is what they say about it: Yes, we have plans, but we do not have a construction permit yet from the FCC. There is a National Weather Service facility across the street from us and it has yet to be determined whether we will cause interference to them. We are constructing a 50 kW transmitter that can cover 5-11 MHz and plan to operate it on 9505 from 6 PM to 8 AM Eastern, rhombic antenna at 40 degrees, primary target Nova Scotia, secondary Europe. Programming will only be the Fundamental Broadcasting Network (via Hans Johnson, (c) *Cumbre DX*) This is in western North Carolina (gh)

WGTG-2 began programming Dec 11 on 6890-USB without carrier from *2100 into the night; all time was immediately sold out on it, per Dave Frantz, who is heavily promoting SSB SW broadcasting, insisting listeners buy SSB-capable receivers (gh)

R. Free Asia added another language in December, Uyghur, 0100-0130 on 15405 KHBI Saipan (Geoffrey Alston, BC-DX)

R. Free Africa was eager to get started in January, provided congressional funding comes through (Nick Grace C., Clandestine Radio Watch)

Tom Valentine's *Radio Free America* show moved to WHRA and former RFPI frequency 7385 at 0200-0500 (via Joe Brashier, WHR, BC-DX)

WORLD OF RADIO latest SW-only master schedule can be found at: <http://www.angelfire.com/ok/worldofradio/wormassw.html> Allan Weiner invited WOR onto WBCQ, 7415, Wednesdays at 2200 (gh)

ZAMBIA ZNBC: William Lukozu, Senior Maintenance Engineer, tells *Cumbre DX* they are still waiting for spare parts in order to operate on 4910. Once it is on, they will use it at 0250-0500 and 1500-2200. They are on as follows for the moment: 6165 Radio Two (English) 0250-2200; 6265 Radio One (Tribal) 0250-2200. Transmitters are run just below their rated 100 kW because of the power from the electrical company. Power is usually 97 kW or so (Hans Johnson- (c) *Cumbre DX* Nov 27)

ZANZIBAR RTZ clear of interference 1800-2100* on 11734.08, best around 1900. QSLs seem to be sparse despite supply of cards I printed and sent them (Guido Schotmans, Belgium, *hard-core-dx*)

ZIMBABWE ZBC are running their 100 kW transmitters at only 25 kW, down from 50 kW last spring, thought to be adequate for national coverage and to save costs. Still *0300 on 3306 Radio 2, 4828 Radio 4 (Hans Johnson, (c) *Cumbre DX*)

Until the Next, Best of DX and 73 de Glenn!

Gayle Van Horn

0000 UTC on 11620

INDIA: All India Radio. Bangalore site for English news and editorial to regional subcontinental music. (Jack Hubby, Cupertino, CA) **AIR-Aligarh** audible on 7410 at 2129-2135. Network news to music program // 11620. (Harold Frodge, Midland, MI) **AIR-Delhi** on 3365, 1615-1645; **AIR-Bhopal** on 3315, 1645-1650. (Don Phillips, USA/Hard Core DX) **AIR-Simla** 3223 at 1505-1530. Clear signal for vernacular text and English news on military action in Pakistan. (Gaku Iwata, Japan/Cumbre DX) **AIR-Kurseong** 4895 at 1525-1535, // 3245 (Lucknow) 3365 (Delhi) 4775 (Imphal) 4800 (Hyderabad) 4840 (Mumbai). (Piet Pijers, Netherlands/Cumbre DX)

0050 UTC on 9675

ITALY: RAI. News that the Italian economy is slowing down. RAI noted 5975 at 1935 with news on the Kurds. (Bob Fraser, Cohasset, MA; William McGuire, Cheverly, MD)

0109 UTC on 7105

UZBEKISTAN: Radio Tashkent. English service including station ID and program announcements. Broadcast marred by Morse code traffic, but readable at times. (Mark Fine, Remington, VA)

0110 UTC on 6895

PERU: Radio San Miguel Arcangel. Peruvian musical program to regional ads. Peruvians audible as **Radio Cuzco** 6200 at 1055, **Radio Satelite** 6725 at 1108. (Camilo Castillo, Panama City, Panama) **Radio Sudamerica** 5522 at 2310-2320; **Radio Ilucan** 5678 at 2315-2320. (Phillips, USA/HCDX) **Radio Super Sensacion** 6618 at 2301. **Radio del Pacifico** 4975 at 0724. (Enzio Gehrig, Denia, Italy/HCDX)

0152 UTC on 4930.6

HONDURAS: Radio Internacional. Overmodulated Spanish religious music. Station IDs and program previews. (Niel Wolfish, Ont, Canada/Cumbre DX)

0200 UTC on 9835

HUNGARY: Radio Budapest. Political and national economic news. (McGuire, MD)

0202 UTC on 11900

FINLAND: YLE/Radio Finland. News on investments in Finland, Finn Air, and item on Sweden. Fair quality. (Hower Moser, Lincolnshire, IL)

0320 UTC on 11785

IRAQ: Radio Iraq Int'l. Items about effects of sanctions, relations with Italy to Arabic string music. (Moser, IL)

0325 UTC on 7175

ERITREA: Voice of the Broad Masses of Eritrea. Lively guitar melody interspersed with short, muffled echo effect from announcer duo. Clear Arabic ID at 0329 as, "hunaasmara, idha'at saut jamahir al iritriyya." Very strong, no doubt running the full 100 kW. (Bob Hill, Littleton, MA/The Four Winds)

0500 UTC on 15110

KUWAIT: Radio Kuwait. English newscast to five time pips and station ID. Anthem to frequency quote for Asian service and mediumwave freqs, into Arabic music. (Hans Johnson, FL/TFW; Ormandy, NZ/HCDX)

0555 UTC on 5047

TOGO: Radiodiffusion Togolaise. French. Weak signal quality as announcers chat to 0600 identification. Signal splatter from 5050 and 5055. (Elmer David Escoto Romero, San Pedro Sula, Honduras/TFW)

0615 UTC on 4915

GHANA: GBC. English service national newscast to, "this is Ghana Broadcasting Corporation Radio One." Time check to regional language. (Frank Hillton, Charleston, SC; Don Phillips, USA/HCDX; Klaus Elsebusch, Marienthal, Germany/HCDX)

0710 UTC on 7125

GUINEA: RTVG/Radio Guinea. Female announcer's French text of the government to brief pop tune. Station ID at 0800 noted as, "Radiodiffusion nationale de Conakrya nos emissionsa merci de votre attention" to 0801*. (Tom Banks, Dallas, TX) 2235-0000 (Wolfish, CAN/Cumbre DX)

0904 UTC on 4865

BRAZIL: Radio Missoes da Amazonia. Portuguese service including lively music to clear canned ID at 0910. Promos to music, closing at 0914. (Al Quaglieri, Albany, NY)

0918 UTC on 4800.7

MEXICO: Radio XERTA. Nonstop Mexican music to canned ID at 0927 as "X-E-R-T-A-" no mention of Radio Transcontinental. Non stop music past 0940. (Quaglieri, NY)

0940 UTC on 3289.93

GUYANA: Voice of. English at audible level (finally!) with Hindu style

music that included English translations text. Hyper car ad dealer to "you are tuned to the Voice of Guyana." (Quaglieri, NY)

0956 UTC on 4886.76

PERU: Radio Virgen del Carmen. Spanish. Tuned into possible sign on with canned announcement by male. Station ID "Radio RVC" with freq quotes at 0957. Local language talk at 1000 to time check and mentions of Huancabamba and "nacional." Live Peruvian band with fair at best with adjacent channel interference. (Dave Valko, PA/TFW)

1118 UTC on 9525

INDONESIA: RRI-Voice of. Chinese chat to Indonesian at 1200. Station ID to network newscast to 1216. Pop Indo tunes with weak signal quality. (Stokes Schwartz, Madison, WI)

1120 UTC on 6674.8

PERU: Radio Impacto. Reactivated frequency and new station name (ex Radio Ondas del Rio Marañon). Address is: Jiron Amazonas No. 315 Aramango, Pvcia de Bagua, Dpto de Amazonas, Peru. Morning communicados, ID and time checks. Peru's Radio Nor Peruana audible on 9960 at 2240. (Rafael Rodriguez, Santefe de Bogota D.C., Colombia/TFW)

1138 UTC on 3205

PAPUA NEW GUINEA: Radio Sandaun. Announcer duo in English/Pidgin with chat and variety music. PNG's noted as; **Radio Madang** on 3260 at 1150-1201*, **Radio East New Britain** on 3385 at 1211-1230+, **NBC** on 4890 1245-1324+. (Harold Frodge, Midland, MI)

1140 UTC on 9650

CANADA: Radio Korea Intl. Report on tour ship from South Korea to visit North Korea, poor to fair quality. (Fraser, MA)

1210 UTC on 17575

FRENCH GUIANA: Radio France Intl. News item regarding France wants London's Waterloo Station renamed, // 15530. (Fraser, MA; Paul Ormandy, Oamaru, New Zealand)

1245 UTC on 17870

SWEDEN: Radio Sweden. Nordic Report features theaters in Sweden, // 21810. (Fraser, MA)

1340 UTC on 13675

UNITED ARAB EMIRATES: UAE Radio. English programming on history of poisons. Close down at 1350 into Arabic service. (Frodge, MI)

1506 UTC on 4925

INDONESIA: RRI-Jambi. Hostess with newscast in Bahasa Indonesian. Presumed program promo to 1509*. Indo's **RRI-Pontianak** audible on 3976.05 at 1515-1541. (Mark Veldhuis, Borne, Netherlands/HCDX; Frodge, MI)

1511 UTC on 4725

MYANMAR: (tentative) Radio Myanmar. Female announcer in regional language to 1517. Monitored to 1520. (Elsebusch, Germany/HCDX)

1615 UTC on 17840

ASCENSION ISLANDS: BBC World Service. *Seeing Stars* on the SOHO sunazing satellite and the Leonid meteor shower. (Fraser, MA)

1915 UTC on 15115

ECUADOR: HCJB. *Studio 9* on saving the turtles and tortoises of Latin America. (Fraser, MA) DX Party Line 0710 on 9775. (Boynton, MA; Ormandy, NZ)

2040 UTC on 6055

RWANDA: Radio Rwanda. Nonstop ballads including Massachusetts by the Bee Gees. Lady announcer briefly at 2055 followed by complete sign-off with freqs in French, English and regional. Instrumental 205-2059 to national anthem, tone for 20 seconds, then off. (Valko, PA/TFW)

2227 UTC on 5100

LIBERIA: Radio Liberia. English programming with highlife tunes and greetings to local listeners. (Frodge, MI)

2240 UTC on 7225

TUNISIA: Radio Tunisienne. Arabic. Continuous music to announcer at 2300, // 7280, 12005. Frequency 7225 and 7280 suffer from amateur radio interference, as well as 7280 fair until Voice of Turkey's sign on. (Lee Silvi, Mentor, OH)

2245 UTC on 4702.21

BOLIVIA: Radio Eco. Regional ads of fair quality. Bolivia's **RadioTropical** 4549.45 at 2300-2320; **Radio Movima** 4471.85 at 2310-2315. (Phillips, USA/HCDX)

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FM

WFCJ, 93.7 kHz.-Miamisburg, OH. Full data prepared QSL card verified and signed by John A. Graham-Chief Engineer. Bumper sticker and station schedule enclosed. Received in three weeks for an FM report and mint stamps. Station address: P.O. Box 937, Dayton, OH 45449. (Robert S. Ross, London, Ontario, Canada/*AmFmTvDx*)

WQLB, 103.3 kHz. Full data prepared QSL card verified by John Carroll. Bumper sticker and key chain/bottle opener enclosed. Received in three weeks for an FM report and mint stamps. Station address: P.O. Box 549, Tawas City, MI 48764-0549. (Ross, CAN/*AmFmTvDx*)

WTNJ, 105.9 kHz. Full data prepared QSL card verified by Randy Kerbaw-Chief Engineer. Bumper stickers enclosed. Received in one month for an FM report and mint stamps. Station address: P.O. Box 1127, Beckley, WV 25802-1127. (Ross, CAN/*AmFmTvDx*)

KALININGRAD

Radio Netherlands relay, 5835 kHz. Despite follow up reports via email, fax and snail mail, my original reception report from over a year ago went unanswered. New report was submitted via email as an attached file, and full data QSL card received (with transmitter site notation) in ten days. email: (English Language Service) <letters@rnw.nl> Station address: P.O. Box 222, 1200 JG Hilversum, The Netherlands. (George Maroti, NY/*Cumbre DX*)

MEDIUM WAVE

1341 kHz AM, Beijing, China. Full data QSL card signed by Ying Lian. Received in 23 days for an AM report. Station address: China Radio International, China 100866 P.R. China. (Patrick Martin, Seaside, OR)

KBGG, 1700 kHz AM-Des Moines, Iowa. No data black & white verification on station letterhead, signed by Eldon L. Schlenker-Director of Engineering. Received in 104 days for an SASE (self-addressed stamped envelope) used for reply. Station address: Two Rivers Broadcasting, 5161 Maple Dr., Pleasant Hill, IA 50317. Ph: 515-261-6100. (Harold Frodge, Midland, MI)

KBHB, 810 kHz AM. No data letter signed by Dana Caldwell-General Manager. Received in nine days for a taped report. Station address: P.O. Box 99, Sturgis, SD 57785. (Martin, OR)

WCMQ, 1700 kHz AM. Verification letter signed by Nini Veras-Acting Asst. Station stickers and station info sheet enclosed. Received in 320 days for an AM report. Station address: 1001 Ponce De Leon Blvd., Coral Gables, FL 33134. (Martin, OR)

WMDM, 1690 kHz AM. Verification letter signed by Stacy Reynolds-Program Director. Received in ten days for an AM report and mint stamps. Station address:

P.O. Box 600, Lexington Park, MD 20653. (Paul Ormandy, Oamaru, New Zealand)

NIGERIA

Voice of Nigeria, 7255 kHz. Full data Broadcasting House, Lagos photo post card signed by Frank Iloye-Station Manager. Received in six months for an English/French report and two IRCs. Station address: Private Mail Bag 40003 Falomo Post Office, Ikoyi, Lagos, Nigeria. (Ellen Jordan, IA/*Cumbre DX*)

PERU

Radio Union, 6115 kHz. Partial data logo card signed by Carlos A. Gonzalez Solimano-Director y Gerente and Natividad Albizuri Salinas-Secretaria de Gerencia. Two station stickers enclosed. Received in 87 days after four taped follow up reports and one U.S. dollar. The last three follow ups were sent registered mail. Station address: Apartado 833, Lima 27, Peru (J.D. Stevens, AL/*Cumbre DX*)

PIRATE

Radio Blandengue via USA relay, 6955 kHz USB. Plain full data card signed by Raul Gonzalez-Operator. Station letter enclosed. Received in 95 days for a pirate report and one U.S. dollar. QSL maildrop: P.O. Box 293, Merlin, Ontario N0P1W0 Canada. (Bill Wilkins, Springfield, MO)

Scream of the Butterfly, 6955 kHz USB. Full data blue card with pictures of Einstein, Bob Dylan and George Harrison, signed by Johnny Rockin'. Received in 53 days for a pirate report, three mint stamps and an address label. QSL maildrop: P.O. Box 28413, Providence, RI 02908. (Wilkins, MO)

UGANDA

Radio Uganda, 4976 kHz. Full data verification on station letterhead, signed by Rachel Nakibuuka-Principle Engineer. This is the second QSL I have received from the station this year. Station address: P.O. Box 2038, Kampala, Uganda. (Zacharias Liangas, Thessaloniki, Greece/*Hard Core DX*)

URUGUAY

CXA19 El Espectador, 11835 kHz. Full data letter signed by Oscar A. Pessano-Gerente de Programacion. Station sticker and folder enclosed. Received in 84 days for a taped report and three IRCs., with the help of Uruguian DXer Horacio A. Nigro, who made several trips to the station to make sure my report received proper attention. The station has suspended shortwave, but may heard via internet at: <<http://www.espectador.com>> (Mickey Delmage, Edmonton, Alberta, Canada)

VENEZUELA

Ecos del Torbes. No data color postcard unsigned. Received in 246 days for a Spanish report, souvenir postcard and one U.S. dollar. Station address: Apartado 152, San Cristobal 5001-A, Tachira, Venezuela (Jon Oldenburg, WI/*Cumbre DX*)

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HOW TO USE THE SHORTWAVE GUIDE

1: Convert your time to UTC.

Eastern and Pacific Times are already converted to Coordinated Universal Time (UTC) at the top of each page. The rule is: convert your local time to 24-hour format; add (during Standard Time) 5, 6, 7, or 8 hours for Eastern, Central, Mountain or Pacific Times, respectively.

Note that all dates, as well as times, are in UTC; for example, a show which might air at 0030 UTC Sunday will be heard on Saturday evening in America (7:30 pm Eastern, 4:30 pm Pacific).

2: Choose a program or station you want to hear.

Some selected programs appear on the lower half of the page for prime listening hours—space does not permit 24-hour listings.

Occasionally program listings will be followed by "See X 0000." This information indicates that the program is a rerun, and refers to a previous summary of the program's content. The letter stands for a day of the week, as indicated below, and the four digits represent a time in UTC.

S: Sunday T: Tuesday H: Thursday A: Saturday
M: Monday W: Wednesday F: Friday

3: Find the frequencies for the program or station you want to hear.

Look at the page which corresponds to the time you will be listening. Comprehensive frequency information for English broadcasts can be found at the top half of the page. All frequencies are in kHz.

The frequency listing uses the same day codes as the program listings; if a broadcast is not daily, those day codes will appear before the

station name. Irregular broadcasts are indicated "tent" and programming which includes languages besides English are coded "vl" (various languages).

4: Choose the most promising frequencies for the time, location and conditions.

Not all stations can be heard and none all the time on all frequencies. To help you find the most promising frequency, we've included information on the target area of each broadcast. Frequencies beamed toward your area will generally be easier to hear than those beamed elsewhere, even though the latter will often still be audible. Every frequency is followed by one of these target codes:

am: The Americas	as: Asia
na: North America	au: Australia
ca: Central America	pa: Pacific
sa: South America	va: various
eu: Europe	do: domestic broadcast
af: Africa	om: omnidirectional
me: Middle East	

Consult the propagation charts. To further help you find the right frequency, we've included charts at the back of this section which take into account conditions affecting the audibility of shortwave broadcasts. Simply pick out the region in which you live and find the chart for the region in which the station you want to hear is located. The chart indicates the optimum frequencies for a given time in UTC.

SWL PROGRAMS

COMPILED BY JIM FRIMMEL

Sundays

0023 Radio Exterior de Espana: "Distance Unknown"
0030 WGTG #1 (Georgia): "World of Radio"
0030 BBC (as): "Write On"
0110 HCJB (am): "DX Partyleine"
0123 Radio Exterior de Espana: "Distance Unknown"
0130 Radio For Peace Intl: "Continent of Media"
0136 Radio Havana Cuba: "DXers Unlimited"
0200 Radio For Peace Intl: "World of Radio"
0258 Vatican Radio: "On-the-Air"
0305 Australia, Radio: "Feedback"
0336 Radio Havana Cuba: "DXers Unlimited"
0400 WHRI (Angel 2 Indiana): "DXing with Cumbre"
0409 HCJB (am): "DX Partyleine"
0423 Voice of Turkey: "DX Corner (biweekly)"
0430 KWHR (Angel 3 Hawaii): "DXing with Cumbre"
0523 Radio Exterior de Espana: "Distance Unknown"
0536 Radio Havana Cuba: "DXers Unlimited"
0600 KWHR (Angel 3 Hawaii): "DXing with Cumbre"
0608 Vatican Radio: "On-the-Air"
0630 World Radio Network (WRN1): "World of Radio"
0730 KWHR (Angel 4 Hawaii): "DXing with Cumbre"
0730 WWCR #3 (Tennessee): "World of Radio"
0834 Radio Vlaanderen Intl: "Radio World"
0836 Radio Korea: "Multiwave Feedback"
0905 BBC: "Write On"
0930 Radio For Peace Intl: "Continent of Media"
1000 Radio For Peace Intl: "World of Radio"
1030 KWHR (Angel 4 Hawaii): "DXing with Cumbre"
1030 WWCR #3 (Tennessee): "World of Radio"
1038 Radio Korea: "Multiwave Feedback"
1134 Radio Vlaanderen Intl: "Radio World"
1136 Radio Korea: "Multiwave Feedback"
1145 WWCR #3 (Tennessee): "Ask WWCR"
1205 BBC (am/au/as): "Write On"
1207 Radio Canada Intl: "The Mailbag"
1236 Radio Korea: "Multiwave Feedback"
1238 Radio Korea: "Multiwave Feedback"
1247 Radio Bulgaria: "Radio Bulgaria Calling"
1300 KWHR (Angel 4 Hawaii): "DXing with Cumbre"
1335 Radio Canada Intl: "The Mailbag"
1354 Vatican Radio: "On-the-Air"
1430 WHRI (Angel 1 Indiana): "DXing with Cumbre"
1436 Radio Canada Intl: "The Mailbag"
1500 World Radio Network (WRN1): "Communications World ABC"
1515 BBC (af): "Waveguide" (27th)
1530 WHRI (Angel 2 Indiana): "DXing with Cumbre"
1534 World Radio Network (WRN1): "Radio World"
1630 KWHR (Angel 3 Hawaii): "DXing with Cumbre"
1636 Radio Korea: "Multiwave Feedback"

1637 Radio Canada Intl: "The Mailbag"
1705 BBC (as): "Write On"
1737 Radio Vlaanderen Intl: "Radio World"
1800 WGTG #1 (Georgia): "World of Radio"
1830 KWHR (Angel 3 Hawaii): "DXing with Cumbre"
1830 WHRI (Angel 2 Indiana): "DXing with Cumbre"
1837 Radio Vlaanderen Intl: "Radio World"
1907 World Radio Network (WRN1): "Radio World"
1936 Radio Korea: "Multiwave Feedback"
2000 Merlin Network One: "Media Zoo"
2100 Merlin Network One: "Media Zoo"
2105 BBC (am/au/as): "Write On"
2108 Radio Korea: "Multiwave Feedback"
2131 Radio Canada Intl: "The Mailbag"
2135 BBC (af): "Write On"
2230 WHRA (Angel 5 Maine): "DXing with Cumbre"
2231 Radio Vlaanderen Intl: "Radio World"
2300 Radio For Peace Intl: "World of Radio"

Mondays

0106 Deutsche Welle: "World DX Meeting" (27th)
0230 Radio Korea: "Multiwave Feedback"
0231 Radio Canada Intl: "The Mailbag"
0305 BBC (am/au/as): "Write On"
0407 Radio Canada Intl: "The Mailbag"
0530 WHRI (Angel 2 Indiana): "DXing with Cumbre"
0600 WWCR #1 (Tennessee): "World of Radio"
0630 WWCR #1 (Tennessee): "Communications World ABC"
0700 Radio For Peace Intl: "World of Radio"
1040 All India Radio: "DX-ers Corner" (1st, 15th)
1500 Radio For Peace Intl: "World of Radio"
1615 KTRW (Guam): "Pacific DX Report"
1840 All India Radio: "DX-ers Corner" (1st, 15th)
2000 Merlin Network One: "Media Zoo"
2100 Merlin Network One: "Media Zoo"
2130 All India Radio: "DX-ers Corner" (1st, 15th)
2135 Radio New Zealand Intl: "Mailbox" (biweekly)
2200 WWCR #1 (Tennessee): "Ask WWCR"

Tuesdays

0030 BBC (as): "Waveguide" (23rd)
0900 KTRW (Guam): "Pacific DX Report"
1330 WWCR #1 (Tennessee): "World of Radio"
1346 Radio Sweden: "MediaScan" (2nd, 16th)
1355 FEBC (Philippines): "DX Dial"
1446 Radio Sweden: "MediaScan" (2nd, 16th)
1846 Radio Sweden: "MediaScan" (2nd, 16th)
1900 Radio For Peace Intl: "World of Radio"
2000 Merlin Network One: "Media Zoo"
2046 World Radio Network (WRN1): "MediaScan" (2nd/16th)

2100 Merlin Network One: "Media Zoo"
2100 Polish Radio: "Polish Radio DX Club"
2111 Radio Havana Cuba: "DXers Unlimited"
2311 Radio Havana Cuba: "DXers Unlimited"
2340 All India Radio: "DX-ers Corner" (9th, 23rd)

Wednesdays

0030 BBC (am/au): "Waveguide" (24th)
0140 Radio Havana Cuba: "DXers Unlimited"
0146 Radio Sweden: "MediaScan" (3rd, 17th)
0246 Radio Sweden: "MediaScan" (3rd, 17th)
0300 Radio For Peace Intl: "World of Radio"
0335 Radio Havana Cuba: "DXers Unlimited"
0346 Radio Sweden: "MediaScan" (3rd, 17th)
0535 Radio Havana Cuba: "DXers Unlimited"
0730 HCJB (eu): "Ham Radio Today"
0730 BBC (af): "Waveguide" (24th)
0930 HCJB (pac): "Ham Radio Today"
1315 FEBC (Philippines): "DX Dial"
1735 Radio New Zealand Intl: "Mailbox" (biweekly)
1820 Argentina, RAE: "DX-ers Special"
1820 Polish Radio: "Polish Radio DX Club"
1930 HCJB (eu): "Ham Radio Today"
2000 Merlin Network One: "Media Zoo"
2100 Merlin Network One: "Atmospherics"
2200 WBCQ (Maine): "World of Radio"
2206 Radio Budapest Intl: "DX Blockbuster"

Thursdays

0030 Australia, Radio: "Media Report"
0130 HCJB (am): "Ham Radio Today"
0239 Argentina, RAE: "DX-ers Special"
0345 Radio Budapest Intl: "DX Blockbuster"
0430 HCJB (am): "Ham Radio Today"
0730 BBC (as): "Waveguide" (25th)
0800 KTRW (Guam): "Pacific DX Report"
0953 Radio Netherlands Intl: "Media Network"
1030 Australia, Radio: "Media Report"
1153 Radio Netherlands Intl: "Media Network"
1230 World Radio Network (WRN1): "Media Report"
1230 BBC (am/au): "Waveguide" (25th)
1320 Polish Radio: "Polish Radio DX Club"
1454 Radio Netherlands Intl: "Media Network"
1753 Radio Netherlands Intl: "Media Network"
1954 Radio Netherlands Intl: "Media Network"
1955 World Radio Network (WRN1): "Media Network"
2000 World Radio Network (WRN1): "Media Network"
2000 Merlin Network One: "Media Zoo"
2100 Merlin Network One: "Media Zoo"
2115 BBC (as): "Waveguide" (25th)

2130 WWCR #1 (Tennessee): "World of Radio"
2330 Australia, Radio: "Media Report"

Fridays

0025 World Radio Network (WRN1): "Media Network"
0054 Radio Netherlands Intl: "Media Network"
0345 BBC (as): "Waveguide" (26th)
0430 WRMI (Florida): "Wavescan"
0453 Radio Netherlands Intl: "Media Network"
0915 BBC (am/au): "Waveguide" (26th)
1030 KTRW (Guam): "Pacific DX Report"
1900 Radio For Peace Intl: "Continent of Media"
1930 WHRA (Angel 5 Maine): "DXing with Cumbre"
1930 Radio New Zealand Intl: "Mailbox" (biweekly)
1930 Radio For Peace Intl: "World of Radio"
2000 Merlin Network One: "Media Zoo"
2047 Radio Bulgaria: "Radio Bulgaria Calling"
2100 WWCR #1 (Tennessee): "Ask WWCR"
2100 Merlin Network One: "Media Zoo"
2105 Australia, Radio: "Feedback"
2338 Voice of Turkey: "DX Corner" (biweekly)

Saturdays

0005 Australia, Radio: "Feedback"
0045 Radio Bulgaria: "Radio Bulgaria Calling"
0136 Voice of America (as pac): "Communications World (A)"
0136 Voice of America (am/au): "Communications World (A)"
0230 KWHR (Angel 3 Hawaii): "DXing with Cumbre"
0300 Radio For Peace Intl: "Continent of Media"
0330 WHRA (Angel 5 Maine): "DXing with Cumbre"
0330 Radio For Peace Intl: "World of Radio"
0336 Voice of America (af): "Communications World (B)"
0345 Radio Bulgaria: "Radio Bulgaria Calling"
0438 Voice of Turkey: "DX Corner (biweekly)"
0536 Voice of America (af): "Communications World (A)"
0536 Voice of America (as pac): "Communications World (A)"
0536 Voice of America (Eu/NA/ME): "Communications World (A)"
0600 KWHR (Angel 3 Hawaii): "DXing with Cumbre"
0600 WHRI (Angel 182 Indiana): "DXing with Cumbre"
0605 Australia, Radio: "Feedback"
0710 HCJB (eu): "DX Partyleine"
0800 KWHR (Angel 4 Hawaii): "DXing with Cumbre"
0830 WHRI (Angel 182 Indiana): "DXing with Cumbre"
0910 HCJB (pac): "DX Partyleine"
0915 WWCR #3 (Tennessee): "Ask WWCR"
0936 Voice of America (as pac): "Communications World (A)"
0940 FEBC (Philippines): "DX Dial"
1100 Radio For Peace Intl: "Continent of Media"

(Continued on page 42)

FREQUENCIES

0000-0100	Anguilla, Caribbean Beacon	6090am				0000-0030	Thailand, Radio	9655af	9680va	11905af	
0000-0100 vl	Australia, ABC/Katherine	5025do				0000-0100	UK, BBC World Service	3915as	5965as	5970sa	5975am
0000-0100 vl	Australia, ABC/Tent Creek	4910do						6175na	6195as	7110as	9410as
0000-0100	Australia, Radio	9660pa	12080as	15240pa	17715pa			5950am	9915sa	11945as	11955as
		17795pa	21740pa					12095sa	15280as	15310as	15360as
		7375na	9485na					17790as			
0000-0100	Bulgaria, Radio	11940as				0000-0100	UK, Merlin Network One	3985eu	9560na		
0000-0015	Cambodia, Natl Radio Of	9625do				0000-0100	Ukraine, R Ukraine Intl	4820eu	5905eu	6020eu	7205eu
0000-0100	Canada, CBC N Quebec Svc	6070do						7420eu			
0000-0100	Canada, CFRX Toronto	6030do				0000-0100	USA, KAU Dallas TX	5810na			
0000-0100	Canada, CFVP Calgary	6130do				0000-0100	USA, KTBN Salt Lk City UT	7510am			
0000-0100	Canada, CHNX Halifax	6160do				0000-0100	USA, KWHR Naalehu HI	17510as			
0000-0100	Canada, CKZN St John's	6160do				0000-0100	USA, Voice of America	7215as	9890as	11760as	1518as
0000-0100	Canada, CKZU Vancouver	6040am	9535am	11865am				15290as	17735pa	17820as	
0000-0029 twfha	Canada, R Canada Intl	5960am	9755am			0000-0100 twfha	USA, Voice of America	5995ca	6130ca	7405sa	9455ca
0000-0059	Canada, R Canada Intl	5900af						9775sa	11695ca	13740sa	
0000-0100 vl	Cent Afr Rep, R Minurca	6070am	11745am	15375am	21550am	0000-0030	USA, Voice of America	5995ca	6130ca	7405sa	9455ca
0000-0100 vl	Chile, R Voz Cristiana	6975am	15050am	21460am				9775sa	11695ca	13740sa	
0000-0100	Costa Rica, RF Peace Intl	7345na	9465na			0000-0100	USA, WBCQ Monticello ME	7415na			
0000-0027	Czech Rep, R Prague Intl	9745na	12015na	21455va		0000-0100	USA, WEWN Birmingham AL	5825va	5850eu		
0000-0100	Ecuador, HCJB	9900am				0000-0100 stwhfa	USA, WGTG McCaysville GA	5085am	6890na		
0000-0030	Egypt, Radio Cairo	11660as				0000-0100	USA, WHRA Greenbush ME	7395af			
0000-0100	Germany, Overcomer Ministr	3300do				0000-0100	USA, WHRI Noblesville IN	7315am			
0000-0100 vl	Guatemala, Radio Cultural	3290do	5950do			0000-0100 twfha	USA, WHRI Noblesville IN	5745am			
0000-0100	Guyana, GBC/Voice of	7410as	9705as	9950as	11620as	0000-0100 sm	USA, WHRI Noblesville IN	5755am			
0000-0045	India, All India Radio	13625as				0000-0100	USA, WINB Red Lion PA	11950ca			
		6200do				0000-0100	USA, WJCR Upton KY	7490na	13595as		
0000-0100	Ireland, Unt Christian BC	6155eu	6180eu	9665af	11705na	0000-0100	USA, WRMI/R Miami Intl	9955sa			
0000-0015	Japan, Radio/NHK	11815as	13650as			0000-0100	USA, WRNO New Orleans LA	7355am			
		5100do				0000-0100	USA, WSHB Cypress Crk SC	7535na	9430am		
0000-0100	Liberia, LCN/R Liberia Int	7295do				0000-0100 as	USA, WWBS Macon GA	11900na			
0000-0100	Malaysia, Radio	7160do				0000-0100	USA, WWCR Nashville TN	3215na	5070na	5935na	7435na
0000-0100	Malaysia, RTM Sarawak	5980do				0000-0100	USA, WYFR Okeechobee FL	6085na	9505na		
0000-0100 vl	Malaysia, RTM Kota Kinabalu	15665as				0000-0030 vl	Vanuatu, Radio	4960do			
0000-0100	N Mariana Is, KHBI Saipan	3270af	3289af			0010-0020	Kyrgyzstan, Kyrgyz Radio	4010do	4050do		
0000-0100 vl	Namibia, NBC	6165na	9845na			0015-0100	Japan, Radio/NHK	6155eu	6180eu	9665af	11705na
0000-0100	Netherlands, Radio	17675pa				0030-0100	Austria, R Austria Intl	7325na			
0000-0100	New Zealand, R NZ Intl	11845am	13650am	15230am		0030-0100	Iran, VOIRI	6065na	9022eu		
0000-0100	North Korea, R Pyongyang	9675do				0030-0100	Lithuania, Radio Vilnius	6120na	9835na		
0000-0100 vl	Papua New Guinea, NBC	15450as				0030-0100 vl	Solomon Islands, SIBC	5020do			
0000-0100	Philippines, FEBC/R Intl	6150do				0030-0100	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
0000-0100	Singapore, R Corp Singapore	6055am				0030-0100	Thailand, Radio	9655as	11905as	13695na	
0000-0100	Spain, R Exterior Espana	7460as				0050-0100	Italy, RAI Intl	6010na	9675na	11800na	
0000-0100	Sri Lanka, IBC Tamil										

SELECTED PROGRAMS

Sundays

0000	Czech Rep, Radio Prague: News. World news summary.
0000	USA, WWCR #1 Nashville TN: Weekly Presidential Radio Address (repeat). A repeat of Bill Clinton's weekly report to the nation.
0000	USA, WWCR #3 Nashville TN: The Hour of Courage. Ron Wilson talks politics and the precious metals market.
0004	Czech Rep, Radio Prague: The Magic Carpet. Classical music from the Czech Republic and neighboring countries.
0008	USA, WWCR #1 Nashville TN: The Republican Response. A noted Republican rebuts the President's weekly radio message.
0015	USA, WWCR #1 Nashville TN: The Blessed Word of Life. Perry L. Johnson preaches in Spanish and English from Washington, DC.
0025	Netherlands, Radio: Insight. Rob Green looks at what made the news in the past seven days.
0030	Austria, R Austria Intl: News from Vienna. A brief world news summary.
0030	Netherlands, Radio: News. Bulletin of world news at the start of all programs.
0030	UK, BBC London (AS): Agenda. See S 0230.
0030	USA, WWCR #1 Nashville TN: The People's Gospel Hour. From Nova Scotia, Canada, Perry Rockwood interprets scripture for Christian life.
0033	Austria, R Austria Intl: Report from Austria. A magazine program covering all aspects of Austrian life and events in the news.
0038	Netherlands, Radio: Europe Unzipped. New! Radio Netherlands' look at events in Europe.
0054	Netherlands, Radio: Weekend. Maggie Ayre joins colleagues from BBC World Service, Radio France International and Deutsche Welle for a weekly look at issues and themes important throughout Europe.

Mondays

0000	Czech Rep, Radio Prague: News. See S 0000.
0000	USA, WWCR #3 Nashville TN: Discoveries in Health (hour 1) (live). A health and herbs show from the American Freedom Network in which new treatments are discussed.
0004	Czech Rep, Radio Prague: Letter from Prague. See S 1405.
0009	Czech Rep, Radio Prague: From the Weeklies. See S 1141.
0018	Czech Rep, Radio Prague: The Arts. See S 0304.
0030	Austria, R Austria Intl: News from Vienna. See S 0030.
0030	Netherlands, Radio: News. See S 0030.
0033	Austria, R Austria Intl: Report from Austria. See S 0033.

0036	Netherlands, Radio: Sincerely Yours. See S 1138.
0037	Austria, R Austria Intl: Postbox. See S 0137.
0055	Austria, R Austria Intl: Music. See S 0146.
0055	Netherlands, Radio: Sounds Interesting. See S 1153.

Tuesdays

0000	Czech Rep, Radio Prague: News. See S 0000.
0000	USA, WWCR #3 Nashville TN: On the Brink (live). Michael Haga tells how to survive the coming great depression.
0004	Czech Rep, Radio Prague: Current Affairs. See M 1104.
0016	Czech Rep, Radio Prague: Spotlight. See M 1116.
0030	Austria, R Austria Intl: News from Vienna. See S 0030.
0030	Netherlands, Radio: News. See S 0030.
0033	Austria, R Austria Intl: Report from Austria. See S 0033.
0038	Netherlands, Radio: Newsline. See M 1138.
0054	Netherlands, Radio: Research File. See M 1153.
0055	UK, BBC London (AE): My Century. NEW! A 5-minute capsule of a big event of the past 100 years. This new program will continue until the millennium and will feature many prominent people sharing special memories.

Wednesdays

0000	Czech Rep, Radio Prague: News. See S 0000.
0000	USA, WWCR #3 Nashville TN: Lyon Gold and Silver Magnet Program (live). See NAm 0530.
0005	Czech Rep, Radio Prague: Current Affairs. See M 1104.
0011	Czech Rep, Radio Prague: Talking Point. See T 1141.
0023	Czech Rep, Radio Prague: Media Check. See S 1148.
0030	Austria, R Austria Intl: News from Vienna. See S 0030.
0030	Netherlands, Radio: News. See S 0030.
0033	Austria, R Austria Intl: Report from Austria. See S 0033.
0040	Netherlands, Radio: Newsline. See M 1138.
0053	Netherlands, Radio: Music 52-15. See T 1153.
0055	UK, BBC London (AE): My Century. NEW! See T 0055.

Thursdays

0000	Czech Rep, Radio Prague: News. See S 0000.
0000	USA, WWCR #3 Nashville TN: On the Brink (live). See NAm 0000.
0005	Czech Rep, Radio Prague: Current Affairs. See M 1104.

0017	Czech Rep, Radio Prague: HistoryCzech. See S 1247.
0030	Austria, R Austria Intl: News from Vienna. See S 0030.
0030	Netherlands, Radio: News. See S 0030.
0033	Austria, R Austria Intl: Report from Austria. See S 0033.
0038	Netherlands, Radio: Newsline. See M 1138.
0053	Netherlands, Radio: Documentary. See W 1153.
0055	UK, BBC London (AE): My Century. NEW! See T 0055.

Fridays

0000	Czech Rep, Radio Prague: News. See S 0000.
0000	USA, WWCR #3 Nashville TN: Lyon Gold and Silver Magnet Program (live). See NAm 0530.
0006	Czech Rep, Radio Prague: Current Affairs. See M 1104.
0018	Czech Rep, Radio Prague: Postbag. Peter Smith provides information about the Czech Republic, commentary on listener letters, and occasional DX news.
0025	Czech Rep, Radio Prague: Music. See T 1425.
0030	Austria, R Austria Intl: News from Vienna. See S 0030.
0030	Netherlands, Radio: News. See S 0030.
0033	Austria, R Austria Intl: Report from Austria. See S 0033.
0038	Netherlands, Radio: Newsline. See M 1138.
0054	Netherlands, Radio: Media Network. See H 1153.
0055	UK, BBC London (AE): My Century. NEW! See T 0055.

Saturdays

0000	Czech Rep, Radio Prague: News. See S 0000.
0000	USA, WWCR #3 Nashville TN: On the Brink (live). See NAm 0000.
0005	Czech Rep, Radio Prague: Current Affairs. See M 1104.
0017	Czech Rep, Radio Prague: Postbag. See F 0018.
0026	Czech Rep, Radio Prague: Music. See T 1425.
0030	Austria, R Austria Intl: News from Vienna. See S 0030.
0030	Netherlands, Radio: News. See S 0030.
0033	Austria, R Austria Intl: Report from Austria. See S 0033.
0038	Netherlands, Radio: Newsline. See M 1138.
0053	Netherlands, Radio: A Good Life. See T 1425.
0055	UK, BBC London (AE): My Century. NEW! See T 0055.



FREQUENCIES

0100-0200	Anguilla, Caribbean Beacon	6090am				0100-0130	Slovakia, R Slovakia Intl	5930na	7300ca	9440sa
0100-0200 vl	Australia, ABC/Katherine	5025do				0100-0200 vl	Solomon Islands, SIBC	5020do		
0100-0200 vl	Australia, ABC/Tent Creek	4910do				0100-0200	Spain, R Exterior Espana	6055am		
0100-0200	Australia, Radio	9660pa	12080as	15240pa	15415as	0100-0200	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as
		17715pa	17750as	17795pa	21740pa	0100-0130	Switzerland, Swiss R Intl	9885na	9905na	
0100-0200	Canada, CBC N Quebec Svc	9625do				0100-0200	UK, BBC World Service	5965as	5970sa	5975am
0100-0200	Canada, CFRX Toronto	6070do						6195as	9410as	9915sa
0100-0200	Canada, CFVP Calgary	6030do						11955as	12095sa	15280as
0100-0200	Canada, CHNX Halifax	6130do						15360as		
0100-0200	Canada, CKZN St John's	6160do				0100-0200	UK, Merlin Network One	3985eu	9560na	
0100-0200	Canada, CKZU Vancouver	6160do				0100-0200	Ukraine, R Ukraine Intl	5905eu	6020eu	7205eu
0100-0200 vl	Cent Afr Rep, R Minurca	5900af						9560eu	9610as	7420na
0100-0200 vl	Chile, R Voz Cristiana	6070am	11690am	11745am	15375am	0100-0200	USA, KAU Dallas TX	5810na		
0100-0200	Costa Rica, RF Peace Intl	6975am	15050am	21460am		0100-0200	USA, KTBN Salt Lk City UT	7510am		
0100-0200	Cuba, Radio Havana	6000na	9820na	13605na		0100-0200	USA, KWHR Naalehu HI	17510as		
0100-0127	Czech Rep, R Prague Intl	6200na	7345na			0100-0200	USA, Voice of America	7115as	7200as	9740as
0100-0200	Ecuador, HCIB	9745na	12015na	21455va				11705as	15250as	15300as
0100-0150	Germany, Deutsche Welle	5960am	6040na	6145am	9640am			17820as		9850as
		9700am						5995ca	6130ca	7405sa
0100-0130 m	Germany, V O Deliverance	6155na				0100-0200 twfha	USA, Voice of America	9775sa	13740sa	9455ca
0100-0200 s	Germany, Good News World R	6155eu						7415na		
0100-0200	Germany, Overcomer Ministr	11660as				0100-0200	USA, WBCQ Monticello ME	5825va	5850eu	
0100-0200 vl	Guatemala, Radio Cultural	3300do				0100-0200 stwhfa	USA, WGTG McCaysville GA	5085am	6890na	
0100-0200	Guyana, GBC/Voice of	3290do	5950do			0100-0200	USA, WHRA Greenbush ME	7395af		
0100-0200	Indonesia, Voice of	9525as	11765as	15510as		0100-0200	USA, WHRI Noblesville IN	7315am		
0100-0130	Iran, VOIRI	6065na	9022eu			0100-0200 twhfss	USA, WHRI Noblesville IN	5745am		
0100-0200	Ireland, Unt Christian BC	6200do				0100-0200 sm	USA, WHRI Noblesville In	5755am		
0100-0110	Italy, RAI Intl	6010na	9675na	11800na		0100-0200	USA, WINB Red Lion PA	11950ca		
0100-0200	Japan, Radio/NHK	6150af	11860as	11870af	15325as	0100-0200	USA, WJCR Upton KY	7490na	13595as	
		15570as	15590as	17685pa	17810as	0100-0200	USA, WRMI/R Miami Intl	9955sa		
		17835sa	21670pa			0100-0200	USA, WRNO New Orleans LA	7355am		
0100-0200	Kenya, Kenya BC Corp	4885do				0100-0200	USA, WSHB Cypress Crk SC	7535na	9430am	
0100-0200	Liberia, LCN/R Liberia Int	5100do				0100-0200 as	USA, WWBS Macon GA	11900na		
0100-0200	Malaysia, Radio	7295do				0100-0200	USA, WWCR Nashville TN	3215na	5070na	5935na
0100-0200 vl	Malaysia, RTM Kota Kinabalu	5980do				0100-0200	USA, WYFR Okaloosa FL	6065na	9505na	15165as
0100-0200 vl	Namibia, NBC	3270af	3289af			0100-0130	Uzbekistan, R Tashkent	5955as	5975as	7105as
0100-0125	Netherlands, Radio	6165na	9845na			0100-0127	Vietnam, Voice of	5940na		
0100-0200	New Zealand, R NZ Intl	17675pa				0115-0145 vl	Libya, Voice of Africa	15235va	15415va	15435va
0100-0200 vl	Papua New Guinea, NBC	9675do				0130-0200	Austria, R Austria Intl	7325na	9495sa	9870sa
0100-0200	Philippines, FEBC/R Intl	15450as				0130-0200	Sweden, Radio	7265au	9435as	11985as
0100-0130 twfha	Serbia, Radio Yugoslavia	7115na				0140-0150	Greece, Voice of	7450na	7475na	9375na
0100-0200	Singapore, R Corp Singapore	6150do				0140-0200	Vatican State, Vatican R	7335as	9650as	9420na

SELECTED PROGRAMS

Sundays

0100	Czech Rep, Radio Prague: News. See S 0000.
0100	USA, WWCR #1 Nashville TN: What Does the Bible Say? Pastor Dennis Costella of the Fundamental Bible Church of Los Osos, California, exposes false teachings and other religions.
0100	USA, WWCR #3 Nashville TN: World of Prophecy. Texe Marrs and a guest discuss the evils and pitfalls of today and the outlook for tomorrow.
0104	Czech Rep, Radio Prague: The Magic Carpet. See S 0004.
0130	Austria, R Austria Intl: News from Vienna. See S 0030.
0130	USA, WWCR #1 Nashville TN: Life's Railway to Heaven. WT English evangelizes from South Carolina.
0133	Austria, R Austria Intl: Report from Austria. See S 0033.
0137	Austria, R Austria Intl: Postbox. David Ward reads listeners' letters.
0140	Greece, Voice of: News. World news in English.
0146	Austria, R Austria Intl: Music. Listen to some of Austria's famous music.

Mondays

0100	Czech Rep, Radio Prague: News. See S 0000.
0100	USA, WWCR #1 Nashville TN: The Jesus Time Network. Walter Bails evangelizes from Gatlinburg, Tennessee.
0100	USA, WWCR #3 Nashville TN: Discoveries in Health (hour 2) (live). The second hour of the health and herbs show from the American Freedom Network.
0104	Czech Rep, Radio Prague: Letter from Prague. See S 1405.
0109	Czech Rep, Radio Prague: From the Weeklies. See S 1141.
0118	Czech Rep, Radio Prague: The Arts. See S 0304.
0125	Netherlands, Radio: Press Review. See S 1225.
0130	Austria, R Austria Intl: News from Vienna. See S 0030.
0130	USA, WWCR #1 Nashville TN: HarvestTime. Gospel music and inspiration from the United Pentecostal Church International.
0133	Austria, R Austria Intl: Report from Austria. See S 0033.
0140	Greece, Voice of: News. See S 0140.
0145	USA, WWCR #1 Nashville TN: First Hand. Rick Livingood with a world evangelism update.

Tuesdays

0100	Czech Rep, Radio Prague: News. See S 0000.
0100	USA, WWCR #1 Nashville TN: Newswatch Magazine. See NAm 1200.
0100	USA, WWCR #3 Nashville TN: The Intelligence Report (live). A patriot radio program with Ted Gunderson.
0104	Czech Rep, Radio Prague: Current Affairs. See M 1104.

0116	Czech Rep, Radio Prague: Spotlight. See M 1116.
0125	Netherlands, Radio: Press Review. See S 1225.
0130	Austria, R Austria Intl: News from Vienna. See S 0030.
0133	Austria, R Austria Intl: Report from Austria. See S 0033.
0140	Greece, Voice of: News. See S 0140.

Wednesdays

0100	Czech Rep, Radio Prague: News. See S 0000.
0100	USA, WWCR #1 Nashville TN: Newswatch Magazine. See NAm 1200.
0100	USA, WWCR #3 Nashville TN: The Intelligence Report (live). See NAm 0100.
0104	Czech Rep, Radio Prague: Current Affairs. See M 1104.
0110	Czech Rep, Radio Prague: Talking Point. See T 1141.
0123	Czech Rep, Radio Prague: Media Check. See S 1148.
0125	Netherlands, Radio: Press Review. See S 1225.
0130	Austria, R Austria Intl: News from Vienna. See S 0030.
0133	Austria, R Austria Intl: Report from Austria. See S 0033.
0140	Greece, Voice of: News. See S 0140.

Thursdays

0100	Czech Rep, Radio Prague: News. See S 0000.
0100	USA, WWCR #1 Nashville TN: Newswatch Magazine. See NAm 1200.
0100	USA, WWCR #3 Nashville TN: The Intelligence Report (live). See NAm 0100.
0105	Czech Rep, Radio Prague: Current Affairs. See M 1104.
0117	Czech Rep, Radio Prague: HistoryCheck. See S 1247.
0125	Netherlands, Radio: Press Review. See S 1225.
0130	Austria, R Austria Intl: News from Vienna. See S 0030.
0133	Austria, R Austria Intl: Report from Austria. See S 0033.
0140	Greece, Voice of: News. See S 0140.

Fridays

0100	Czech Rep, Radio Prague: News. See S 0000.
0100	USA, WWCR #1 Nashville TN: Newswatch Magazine. See NAm 1200.
0100	USA, WWCR #3 Nashville TN: The Intelligence Report (live). See NAm 0100.
0106	Czech Rep, Radio Prague: Current Affairs. See M 1104.
0118	Czech Rep, Radio Prague: Postbag. See F 0018.
0125	Czech Rep, Radio Prague: Music. See T 1425.
0125	Netherlands, Radio: Press Review. See S 1225.
0130	Austria, R Austria Intl: News from Vienna. See S 0030.
0133	Austria, R Austria Intl: Report from Austria. See S 0033.
0140	Greece, Voice of: News. See S 0140.

Saturdays

0100	Czech Rep, Radio Prague: News. See S 0000.
0100	USA, WWCR #1 Nashville TN: Newswatch Magazine. See NAm 1200.
0100	USA, WWCR #3 Nashville TN: American Sovereign (live). Brett Johnson.
0106	Czech Rep, Radio Prague: Current Affairs. See M 1104.
0117	Czech Rep, Radio Prague: Postbag. See F 0018.
0126	Czech Rep, Radio Prague: Music. See T 1425.
0130	Austria, R Austria Intl: News from Vienna. See S 0030.
0133	Austria, R Austria Intl: Report from Austria. See S 0033.
0140	Greece, Voice of: News. See S 0140.

SWL Programs, continued from page 40

1130	Radio For Peace Intl: "World of Radio"
1136	Voice of America (as pac): "Communications World (A)"
1245	WWCR #1 (Tennessee): "Communications World ABC"
1247	Radio Bulgaria: "Radio Bulgaria Calling"
1300	WWCR #1 (Tennessee): "Communications World ABC"
1300	WWCR #3 (Tennessee): "World of Radio"
1336	Voice of America (as pac): "Communications World (B)"
1342	Radio Tashkent: "Radio Tashkent DX Program"
1345	Voice of Turkey: "DX Corner" (biweekly)
1455	FEBC (Philippines): "DX Dial"
1530	WHRI (Angel 2 Indiana): "DXing with Cumbre"
1536	Voice of America (as pac): "Communications World (C)"
1700	World Radio Network (WRN1): "World of Radio"
1730	Radio For Peace Intl: "Continent of Media"
1736	Voice of America (af): "Communications World (A)"
1736	Voice of America (as pac): "Communications World (A)"

(Continued on page 43)

FREQUENCIES

0200-0300	Anguilla, Caribbean Beacon	6090am				0200-0300	Singapore, R Corp Singapore	6150do			
0200-0300 twfha	Argentina, RAE	11710am				0200-0300 vl	Solomon Islands, SIBC	5020do			
0200-0300 vl	Australia, ABC/Katherine	5025do				0200-0300	South Korea, R Korea Intl	7275am	11725am	11810am	15575am
0200-0300	Australia, ABC/Tent Creek	4910do				0200-0300	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
0200-0300	Australia, Radio	9660pa	12080as	15240pa	15415as	0200-0300	Taiwan, Radio Taipei Intl	5950na	7130as	9680na	11740am
		15510pa	17715pa	17750as	21725pa			11825pa	15345as		
0200-0210	Bangladesh, Bangla Betar	4880as				0200-0300	UK, BBC World Service	5970sa	5975am	6175na	6185am
0200-0300	Canada, CBC N Quebec Svc	9625do						9410as	9605as	9770af	9915sa
0200-0300	Canada, CFRX Toronto	6070do						11955as	15280as	15310as	15360as
0200-0300	Canada, CFVP Calgary	6030do				0200-0300	UK, Merlin Network One	3985eu			
0200-0300	Canada, CHNX Halifax	6130do				0200-0300	USA, KAU Dallas TX	5810am			
0200-0300	Canada, CKZN St John's	6160do				0200-0300 vl	USA, KJES Mesquite NM	7555am			
0200-0300	Canada, CKZU Vancouver	6160do				0200-0300	USA, KTBH Salt Lk City UT	7510am			
0200-0259	Canada, R Canada Intl	6155am	9535am	9755am	9780am	0200-0300	USA, KWHR Naalehu HI	17510as			
		11865am				0200-0300	USA, Voice of America	7115as	7200as	9740as	9850as
0200-0300 vl	Cent Afr Rep, R Minurca	5900af						11705as	15250as	15300as	17740as
0200-0300 vl	Chile, R Voz Cristiana	6070am	11690am	11745am	15375am			17820as			
0200-0300	Costa Rica, RF Peace Intl	6975am	15050am	21460am		0200-0300	USA, WBCQ Monticello ME	7415na			
0200-0205	Croatia, Croatian Radio	6130na				0200-0300	USA, WEWN Birmingham AL	5825va			
0200-0300	Cuba, Radio Havana	6000na	9820na	13605na		0200-0300 stwhfa	USA, WGTG McCaysville GA	5085am	6890na		
0200-0300	Ecuador, HCJB	9745na	12015na	21455va		0200-0300	USA, WHRA Greenbush ME	7385af			
0200-0300	Egypt, Radio Cairo	9475na				0200-0300	USA, WHRI Noblesville IN	7315am			
0200-0250	Germany, Deutsche Welle	6035as	7225as	7285as	9615as	0200-0300 twhfes	USA, WHRI Noblesville IN	5745am			
		9765as	9815as			0200-0300 sm	USA, WHRI Noblesville IN	5755am			
0200-0300	Germany, Overcomer Ministr	11660as				0200-0300	USA, WINB Red Lion PA	11950ca			
0200-0300	Guyana, GBC/Voice of	3290do	5950do			0200-0300	USA, WJCR Upton KY	7490na	13595as		
0200-0230	Hungary, Radio Budapest	6135na	9835na			0200-0300	USA, WRMI/R Miami Intl	9955sa			
0200-0300	Ireland, Unt Christian BC	6200do				0200-0300	USA, WRNO New Orleans LA	7355am			
0200-0300	Kenya, Kenya BC Corp	4935do				0200-0300	USA, WSHB Cypress Crk SC	5850na	7535am		
0200-0300	Malaysia, Radio	7295do				0200-0300	USA, WWCR Nashville TN	3215na	5070na	5935na	7435na
0200-0250	Myanmar, Radio	7185do				0200-0300	USA, WYFR Okeechobee FL	6065na	9505na		
0200-0300 vl	Namibia, NBC	3270af	3289af			0215-0220	Nepal, Radio	3230as	5005as		
0200-0300	New Zealand, R NZ Intl	17675pa				0230-0245	Pakistan, Radio	9470as	11975as	15235as	15485as
0200-0300 vl	Papua New Guinea, NBC	9675do				0230-0300 vl	Philippines, R Pilipinas	11805as	15120as	15270as	
0200-0300	Philippines, FEBC/R Intl	15450as				0230-0300	Sweden, Radio	7280am	9455am		
0200-0300	Romania, R Romania Intl	5990na	9570na	11740as	11830na	0230-0257	Vietnam, Voice of	5940na			
		11940as	15380as			0245-0300	Albania, R Tirana Intl	6115na	7160na		
0200-0300	Russia, Voice of Russia WS	7180na	9865na	9875na	12020na	0250-0300 sf	Greece, Voice of	7450na	7475na	9375na	9420na
0200-0230	Serbia, Radio Yugoslavia	7130na				0250-0300	Vatican State, Vatican R	7305ca	9605am		

SELECTED PROGRAMS

Sundays

- 0200 Romania, R Romania Intl: Radio Newsreel. World and Bulgarian news.
- 0200 USA, WWCR #1 Nashville TN: Faith Holiness Church. Larry Cain evangelizes from South Carolina.
- 0200 USA, WWCR #3 Nashville TN: Tomorrow's News Today. George Hyatt is not the presenter, he's the evangelist.
- 0230 Romania, R Romania Intl: World of Culture. A review of cultural activities of the last week.
- 0230 UK, BBC London (AE): Agenda. A new weekly topical program which explores the thinking shaping today's politics, economics, arts and culture.
- 0230 USA, WWCR #1 Nashville TN: The Lights of Spiritual Guidance. Gospel and song with J. Harold Lowman.
- 0230 USA, WWCR #3 Nashville TN: Dixie Rising. Dan Meredith wants the South to rise again.
- 0250 Vatican State, Vatican Radio: With Heart and Mind. How this week's liturgical readings apply to our everyday lives.
- 0258 Vatican State, Vatican Radio: On-the-Air. A preview of upcoming programs and broadcast changes and a look behind-the-scenes at Vatican Radio.

Mondays

- 0200 Romania, R Romania Intl: Radio Newsreel. See S 0200.
- 0200 USA, WWCR #1 Nashville TN: Tomorrow's News Today. See NAm 0200.
- 0200 USA, WWCR #3 Nashville TN: J. Michael Stevens Show (live). J. Michael Stevens.
- 0215 USA, WWCR #1 Nashville TN: Unshackled. Pacific Garden Mission's radio drama.
- 0230 Romania, R Romania Intl: Panorama (Radio Tour). See S 2330.
- 0245 USA, WWCR #1 Nashville TN: The Last Day Message. Rick Long's message is garnished with fire and brimstone.
- 0250 Vatican State, Vatican Radio: And So They Came to Rome. The people who have come to the eternal city over the years.

Tuesdays

- 0200 Romania, R Romania Intl: Radio Newsreel. See S 0200.
- 0200 USA, WWCR #1 Nashville TN: Live Fire (live). Larry Pratt of The Gun Owners of America represents the gun lobby.
- 0200 USA, WWCR #3 Nashville TN: The Stan Solomon Show (live). A conservative, no-holds-barred commentary on American life that challenges people to become involved in the country's direction.
- 0230 Romania, R Romania Intl: Pro Memoria. See M 2330.
- 0250 Vatican State, Vatican Radio: A Room with a View of the Vatican. A look at the activities of the Catholic Church in Rome.
- 0255 Vatican State, Vatican Radio: As Romans Turn. Focusing on out-of-the-way religious and other events in the eternal city.

Wednesdays

- 0200 Romania, R Romania Intl: Radio Newsreel. See S 0200.
- 0200 USA, WWCR #1 Nashville TN: Perspectives on America (live). Jeff Bennett talks about preparedness issues.
- 0200 USA, WWCR #3 Nashville TN: The Stan Solomon Show (live). See NAm 0200.
- 0230 Romania, R Romania Intl: Business Club. See T 2330.
- 0230 UK, BBC London (AE): Women Who Dared to Speak. See S 0530.
- 0250 Vatican State, Vatican Radio: The Rome Report. A behind the scenes review of issues currently confronting the church and the world.

Thursdays

- 0200 Romania, R Romania Intl: Radio Newsreel. See S 0200.
- 0200 USA, WWCR #1 Nashville TN: Perspectives on America (live). See NAm 0200.
- 0200 USA, WWCR #3 Nashville TN: The Stan Solomon Show (live). See NAm 0200.
- 0230 Romania, R Romania Intl: Society. See W 2330.
- 0250 Vatican State, Vatican Radio: The Pope and the People. Recent public statements by the Pope and responses from the man on the street.
- 0254 Vatican State, Vatican Radio: Pilgrim City. A look at whose been to Rome recently.

Fridays

- 0200 Romania, R Romania Intl: Radio Newsreel. See S 0200.
- 0200 USA, WWCR #1 Nashville TN: Perspectives on America (live). See NAm 0200.
- 0200 USA, WWCR #3 Nashville TN: The Stan Solomon Show (live). See NAm 0200.
- 0230 Romania, R Romania Intl: Citizens of the Same Country. See H 2330.
- 0250 Greece, Voice of: News. See S 0140.
- 0250 Vatican State, Vatican Radio: Then and Now. Whatever happened to yesterday's headlines?

Saturdays

- 0200 Romania, R Romania Intl: Radio Newsreel. See S 0200.
- 0200 USA, WWCR #1 Nashville TN: American Sovereign (live). See NAm 0100.
- 0200 USA, WWCR #3 Nashville TN: The Stan Solomon Show (live). See NAm 0200.
- 0230 Romania, R Romania Intl: Panorama (European Option). See F 2330.
- 0250 Vatican State, Vatican Radio: Echoes of an Era. The Popes in the twentieth century remembered by those who knew them.

SWL Programs, continued from page 42

- 1736 Voice of America (Eu/NA/ME): "Communications World (A)"
- 1800 Radio For Peace Intl: "World of Radio"
- 1830 WHRI (Angel 1 Indiana): "DXing with Cumbre"
- 1909 HCJB (eu): "DX Partyline"
- 1936 Voice of America (af): "Communications World (C)"
- 1936 Voice of America (as pac): "Communications World (C)"
- 2000 Merlin Network One: "Media Zoo"
- 2015 Voice of Turkey: "DX Corner" (biweekly)
- 2058 Vatican Radio: "On-the-Air"
- 2100 Merlin Network One: "Media Zoo"
- 2114 Radio Havana Cuba: "DXers Unlimited"
- 2130 WWCR #3 (Tennessee): "Ask WWCR"
- 2130 WHRA (Angel 5 Maine): "DXing with Cumbre"
- 2136 Voice of America (as pac): "Communications World (B)"
- 2231 Radio Exterior de Espana: "Distance Unknown"
- 2247 Radio Bulgaria: "Radio Bulgaria Calling"
- 2300 WHRI (Angel 2 Indiana): "DXing with Cumbre"
- 2300 Vatican Radio: "On-the-Air"
- 2306 Radio Havana Cuba: "DXers Unlimited"
- 2323 Voice of Turkey: "DX Corner (biweekly)"
- 2330 WHRI (Angel 1 Indiana): "DXing with Cumbre"



FREQUENCIES

0300-0400	Anguilla, Caribbean Beacon	6090am				0300-0400	Singapore, RCorp Singapore	6150do			
0300-0400 vl	Australia, ABC/Katherine	5025do				0300-0400	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
0300-0400 vl	Australia, ABC/Tent Creek	4910do				0300-0400	Taiwan, Radio Taipei Intl	5950na	9680na	11745as	11825as
0300-0400	Australia, Radio	9660pa	12080as	15240pa	15415as			15345as			
		15510pa	17715pa	17750as	21725pa			9655am	11905am	15460na	
0300-0400	Australia, Defense Forces R	14790as				0300-0330	Thailand, Radio	4976do			
0300-0359 smwfa	Belarus, R Belarus Intl	7105eu	7210eu			0300-0400	Uganda, Radio	3255af	5975am	6005af	6175na
0300-0400 vl	Botswana, Radio	4820do	4830do	7255do		0300-0400	UK, BBC World Service	6185am	6190af	7160af	9410eu
0300-0400	Bulgaria, Radio	7375na	9485na					11730af	11760me	11765af	11955as
0300-0400	Canada, CBC N Quebec Svc	9625do						12095af	15310as	15360as	17790as
0300-0400	Canada, CFRX Toronto	6070do						21660as			
0300-0400	Canada, CFVP Calgary	6030do				0300-0400	UK, Merlin Network One	3985eu	9895eu		
0300-0400	Canada, CHNX Halifax	6130do				0300-0400	USA, KAU Dallas TX	5810na			
0300-0400	Canada, CKZN St John's	6160do				0300-0330 vl	USA, KJES Mesquite NM	7555na			
0300-0400	Canada, CKZU Vancouver	6160do				0300-0400	USA, KTBN Salt Lk City UT	7510am			
0300-0329 twhfa	Canada, R Canada Intl	6155am	9755am	9780am		0300-0400	USA, KVOH Los Angeles CA	9975am			
0300-0359 sm	Canada, R Canada Intl	6155am	9755am	9780am		0300-0400	USA, KWHR Nacoleu HI	17510as			
0300-0400 vl	Cent Afr Rep, R Minurca	5900af				0300-0400	USA, Voice of America	6035af	6080af	7105af	7290af
0300-0400 vl	Chile, R Voz Cristiana	6070na	11690am	11745am	15375am			7340af	7415af	9575af	9885af
0300-0356	China, China Radio Intl	9690am				0300-0330 mtwh	USA, Voice of America	4960af			
0300-0400	Costa Rica, RF Peace Intl	6975am	15050am	21460am		0300-0400	USA, WEWN Birmingham AL	5825va			
0300-0305	Croatia, Croatian Radio	6130eu				0300-0400 stwhfa	USA, WGTG McCaysville GA	5085am	6890na		
0300-0400	Cuba, Radio Havana	6000na	9820na	13605na		0300-0400	USA, WHRA Greenbush ME	7385af			
0300-0327	Czech Rep, R Prague Intl	7345na	9435na			0300-0400	USA, WHRI Noblesville IN	7315am			
0300-0400	Ecuador, HCJB	9745na	12015na	21455va		0300-0400 twhfes	USA, WHRI Noblesville IN	5745am			
0300-0330	Egypt, Radio Cairo	9475am				0300-0400 sm	USA, WHRI Noblesville IN	5755am			
0300-0350	Germany, Deutsche Welle	6045na	9535am	9640na	9700na	0300-0400	USA, WJCR Upton KY	7490na	13595as		
		11750na				0300-0400	USA, WRMI/R Miami Intl	9955sa			
0300-0400	Germany, Overcomer Ministr	11660as				0300-0400	USA, WRNO New Orleans LA	7355am			
0300-0400 vl	Guatemala, Radio Cultural	3300do				0300-0400	USA, WSHB Cypress Crk SC	5850na	7535am		
0300-0400	Guyana, GBC/Voice of	3290do	5950do			0300-0400	USA, WWCR Nashville TN	3215na	5070na	5935na	7435na
0300-0400 irreg	Iraq, Radio Iraq Intl	11785am				0300-0400	USA, WYFR Okeshobee FL	6065na	9505na		
0300-0400	Ireland, Unt Christian BC	6200do				0300-0400	Zambia, Natl BC Corp	6165do	6265do		
0300-0400 as/vl	Italy, IRRS	7120va				0300-0400 vl	Zimbabwe, Zimbabwe BC	3306do	4828do		
0300-0400	Japan, Radio/NHK	17810as	17825ca	21610pa		0310-0315 thfa/vl	Kyrgyzstan, Kyrgyz Radio	4010do	4050do		
0300-0400	Kenya, Kenya BC Corp	4885do	4935do			0310-0340	Vatican State, Vatican R	9660af			
0300-0400 vl	Lesotho, Radio	4800do				0330-0400	Albania, R Tirana Intl	6115na	7160na		
0300-0400	Malaysia, Radio	7295do				0330-0357	Czech Rep, R Prague Intl	9585as	11600as		
0300-0355	Moldova, R Moldova Intl	7500na				0330-0400	Hungary, Radio Budapest	9835na	11990na		
0300-0400 vl	Namibia, NBC	3270af	3289af			0330-0350 vl	Libya, Voice of Africa	15235va	15415va	15435va	
0300-0400	New Zealand, R NZ Intl	17675pa				0330-0400 vl	Philippines, R Pilipinas	13770as	15330as	17730as	
0300-0400 vl	Papua New Guinea, NBC	9675do				0330-0400	Sweden, Radio	7115na	9435am		
0300-0330 vl	Philippines, R Pilipinas	11805as	15120as	15270as		0330-0400	Tanzania, Radio	5050af			
0300-0400	Russia, Voice of Russia WS	5940na	7180na	9865na	9875na	0330-0355	UAE, Radio Dubai	12005na	13675na	15400na	
		12020na				0340-0350	Greece, Voice of	7450na	9375na	9420na	
0300-0325	S Africa, Channel Africa	9525af				0345-0400	Tajikistan, Radio	7245as	9905as	11620as	
						0356-0400	Zambia, Christian Voice	3330af	6065af		

SELECTED PROGRAMS

Sundays

0300	Bulgaria, Radio: News. Ten or fifteen minutes of world and Bulgarian news.	0300	USA, WWCR #3 Nashville TN: The Stan Solomon Show (live). See Nam 0200.
0300	Czech Rep, Radio Prague: News. See S 0000.	0304	Czech Rep, Radio Prague: Current Affairs. See M 1104.
0300	USA, WWCR #1 Nashville TN: Open Bible Dialogue. Joseph Chambers preaches Bible prophecy from North Carolina.	0310	Bulgaria, Radio: Events and Development. A review of upcoming events this week.
0300	USA, WWCR #3 Nashville TN: Sound the Alarm. Heath Goodman.	0316	Czech Rep, Radio Prague: Spotlight. See M 1116.
0304	Czech Rep, Radio Prague: The Arts. A particular topic concerning Czech art followed by focus on a Czech author.	0325	Bulgaria, Radio: Magazine Economy. Economic news briefs and financial developments in Bulgaria.
0305	UK, BBC London (AS): Wright Around the World. See S 1205.	0340	Bulgaria, Radio: Keyword Bulgaria. See S 0325.
0310	Bulgaria, Radio: News Behind the News. Background to specific items of current affairs.	0340	Greece, Voice of: News. See S 0140.
0312	Czech Rep, Radio Prague: Let's Go. Old time Czech jazz music.		
0325	Bulgaria, Radio: Keyword Bulgaria. Interesting facts about things Bulgarian.		
0330	USA, WWCR #3 Nashville TN: A Company of Prophets. Marty Shurc.		
0340	Bulgaria, Radio: Answering Your Letters. Replies to listener letters and Bulgarian Music.		
0340	Greece, Voice of: News. See S 0140.		

Mondays

0300	Bulgaria, Radio: News. See S 0300.	0300	Bulgaria, Radio: News. See S 0300.
0300	Czech Rep, Radio Prague: News. See S 0000.	0300	Czech Rep, Radio Prague: News. See S 0000.
0300	USA, WWCR #1 Nashville TN: World of Prophecy. See Nam 0100.	0300	USA, WWCR #1 Nashville TN: The Stan Solomon Show (live). See Nam 0200.
0300	USA, WWCR #3 Nashville TN: Mike Jarmus Program (hour 1) (live). Mike, his guests, and callers discuss UFOs and other far out topics.	0300	USA, WWCR #3 Nashville TN: The Stan Solomon Show (live). See Nam 0200.
0305	Czech Rep, Radio Prague: The Week in Politics. See S 1134.	0304	Czech Rep, Radio Prague: Current Affairs. See M 1104.
0310	Bulgaria, Radio: Folk Studio. Myths, legends, customs, and rituals associated with Bulgarian holidays.	0310	Bulgaria, Radio: Events and Development. See T 0310.
0312	Czech Rep, Radio Prague: From the Weeklies. See S 1141.	0311	Czech Rep, Radio Prague: Talking Point. See T 1141.
0318	Czech Rep, Radio Prague: Media Check. See S 1148.	0323	Czech Rep, Radio Prague: Media Check. See S 1148.
0325	Bulgaria, Radio: Plaza Bulgaria. Thirty minutes about Bulgaria and things Bulgarian.	0325	Bulgaria, Radio: Art and Artists. A five-minute look at a cultural event in Bulgaria.
0340	Greece, Voice of: News. See S 0140.	0330	Bulgaria, Radio: Timeout for Music. A wide variety of Bulgarian classical, pop and folk music is played.
		0340	Greece, Voice of: News. See S 0140.
		0341	Bulgaria, Radio: Keyword Bulgaria. See S 0325.

Tuesdays

0300	Bulgaria, Radio: News. See S 0300.	0300	Bulgaria, Radio: News. See S 0300.
0300	Czech Rep, Radio Prague: News. See S 0000.	0300	Czech Rep, Radio Prague: News. See S 0000.
0300	USA, WWCR #1 Nashville TN: Stairway to Health (live). Constance Taylor of Republic.	0300	USA, WWCR #1 Nashville TN: Now We're Cookin' (live). J. Bennett and J. Wells.

Wednesdays

0300	Bulgaria, Radio: News. See S 0300.	0300	Bulgaria, Radio: News. See S 0300.
0300	Czech Rep, Radio Prague: News. See S 0000.	0300	Czech Rep, Radio Prague: News. See S 0000.
0300	USA, WWCR #1 Nashville TN: Perspectives on America (live). See Nam 0200.	0300	USA, WWCR #1 Nashville TN: The Stan Solomon Show (live). See Nam 0200.
0300	USA, WWCR #3 Nashville TN: The Stan Solomon Show (live). See Nam 0200.	0304	Czech Rep, Radio Prague: Current Affairs. See M 1104.
0304	Czech Rep, Radio Prague: Current Affairs. See M 1104.	0310	Bulgaria, Radio: Events and Development. See T 0310.
0310	Bulgaria, Radio: Events and Development. See T 0310.	0311	Czech Rep, Radio Prague: Talking Point. See T 1141.
0311	Czech Rep, Radio Prague: Talking Point. See T 1141.	0323	Czech Rep, Radio Prague: Media Check. See S 1148.
0323	Czech Rep, Radio Prague: Media Check. See S 1148.	0325	Bulgaria, Radio: Art and Artists. A five-minute look at a cultural event in Bulgaria.
0325	Bulgaria, Radio: Timeout for Music. A wide variety of Bulgarian classical, pop and folk music is played.	0330	Bulgaria, Radio: Timeout for Music. A wide variety of Bulgarian classical, pop and folk music is played.
0330	Bulgaria, Radio: Timeout for Music. A wide variety of Bulgarian classical, pop and folk music is played.	0340	Greece, Voice of: News. See S 0140.
0340	Greece, Voice of: News. See S 0140.	0341	Bulgaria, Radio: Keyword Bulgaria. See S 0325.

Thursdays

0300	Bulgaria, Radio: News. See S 0300.	0300	Bulgaria, Radio: News. See S 0300.
0300	Czech Rep, Radio Prague: News. See S 0000.	0300	Czech Rep, Radio Prague: News. See S 0000.
0300	USA, WWCR #1 Nashville TN: Now We're Cookin' (live). J. Bennett and J. Wells.	0300	USA, WWCR #1 Nashville TN: The Stan Solomon Show (live). See Nam 0200.
0300	USA, WWCR #3 Nashville TN: The Stan Solomon Show (live). See Nam 0200.	0300	USA, WWCR #3 Nashville TN: The Stan Solomon Show (live). See Nam 0200.
0305	Czech Rep, Radio Prague: Current Affairs. See M 1104.	0304	Czech Rep, Radio Prague: Current Affairs. See M 1104.
0310	Bulgaria, Radio: Events and Development. See T 0310.	0310	Bulgaria, Radio: Events and Development. See T 0310.
0317	Czech Rep, Radio Prague: History/Czech. See S 1247.	0317	Czech Rep, Radio Prague: History/Czech. See S 1247.
0325	Bulgaria, Radio: Timeout for Music. See W 0330.	0325	Bulgaria, Radio: Timeout for Music. See W 0330.
0340	Greece, Voice of: News. See S 0140.	0340	Greece, Voice of: News. See S 0140.
0343	Bulgaria, Radio: Keyword Bulgaria. See S 0325.	0343	Bulgaria, Radio: Keyword Bulgaria. See S 0325.

Fridays

0300	Bulgaria, Radio: News. See S 0300.	0300	Bulgaria, Radio: News. See S 0300.
0300	Czech Rep, Radio Prague: News. See S 0000.	0300	Czech Rep, Radio Prague: News. See S 0000.

0300	USA, WWCR #1 Nashville TN: Perspectives on America (live). See Nam 0200.	0300	USA, WWCR #1 Nashville TN: Perspectives on America (live). See Nam 0200.
0300	USA, WWCR #3 Nashville TN: The Stan Solomon Show (live). See Nam 0200.	0300	USA, WWCR #3 Nashville TN: The Stan Solomon Show (live). See Nam 0200.
0305	Czech Rep, Radio Prague: Current Affairs. See M 1104.	0305	Czech Rep, Radio Prague: Current Affairs. See M 1104.
0310	Bulgaria, Radio: Events and Development. See T 0310.	0310	Bulgaria, Radio: Events and Development. See T 0310.
0316	Czech Rep, Radio Prague: Economic Report. See H 1144.	0316	Czech Rep, Radio Prague: Economic Report. See H 1144.
0324	Czech Rep, Radio Prague: Music. See T 1425.	0324	Czech Rep, Radio Prague: Music. See T 1425.
0325	Bulgaria, Radio: The Way We Live. A program that offers a broad range of topics on Bulgarian life.	0325	Bulgaria, Radio: The Way We Live. A program that offers a broad range of topics on Bulgarian life.
0333	Bulgaria, Radio: Timeout for Music. See W 0330.	0333	Bulgaria, Radio: Timeout for Music. See W 0330.
0340	Greece, Voice of: News. See S 0140.	0340	Greece, Voice of: News. See S 0140.
0344	Bulgaria, Radio: Keyword Bulgaria. See S 0325.	0344	Bulgaria, Radio: Keyword Bulgaria. See S 0325.

Saturdays

0300	Bulgaria, Radio: News. See S 0300.	0300	Bulgaria, Radio: News. See S 0300.
0300	Czech Rep, Radio Prague: News. See S 0000.	0300	Czech Rep, Radio Prague: News. See S 0000.
0300	USA, WWCR #1 Nashville TN: The Survival Report (live). Robert Henry offers mail order products from his Florida operation.	0300	USA, WWCR #1 Nashville TN: The Survival Report (live). Robert Henry offers mail order products from his Florida operation.
0300	USA, WWCR #3 Nashville TN: The Stan Solomon Show (live). See Nam 0200.	0300	USA, WWCR #3 Nashville TN: The Stan Solomon Show (live). See Nam 0200.
0305	Czech Rep, Radio Prague: Current Affairs. See M 1104.	0305	Czech Rep, Radio Prague: Current Affairs. See M 1104.
0310	Bulgaria, Radio: Events and Development. See T 0310.	0310	Bulgaria, Radio: Events and Development. See T 0310.
0318	Czech Rep, Radio Prague: Postbag. See F 0018.	0318	Czech Rep, Radio Prague: Postbag. See F 0018.
0325	Bulgaria, Radio: The Way We Live. See F 0325.	0325	Bulgaria, Radio: The Way We Live. See F 0325.
0325	Czech Rep, Radio Prague: Music. See T 1425.	0325	Czech Rep, Radio Prague: Music. See T 1425.
0340	Greece, Voice of: News. See S 0140.	0340	Greece, Voice of: News. See S 0140.
0345	Bulgaria, Radio: Radio Bulgaria Colling. A fifteen-minute program for shortwave listeners.	0345	Bulgaria, Radio: Radio Bulgaria Colling. A fifteen-minute program for shortwave listeners.
0355	Czech Rep, Radio Prague: Music. See T 1425.	0355	Czech Rep, Radio Prague: Music. See T 1425.

FREQUENCIES

0400-0500	Anguilla, Caribbean Beacon	6090am				0400-0500	Switzerland, Swiss R Intl	9885na	9905na		
0400-0430	Armenia, Voice of	4810va				0400-0430	Tanzania, Radio	5050af			
0400-0500 vl	Australia, ABC/Katherine	5025do				0400-0500	Turkey, Voice of	7240va	9655va	21715va	
0400-0500 vl	Australia, ABC/Tent Creek	4910do				0400-0500	Uganda, Radio	4976do			
0400-0500	Australia, Radio	9660pa	12080as	15240pa	15415as	0400-0500	UK, BBC World Service	3255af	3955eu	5975am	6005af
		15510pa	17715pa	17750as	21725pa			6175na	6180eu	6185am	6190af
0400-0500	Australia, Defense Forces R	14790as						6195eu	7160af	9410eu	11760me
0400-0500 vl	Botswana, Radio	4820do	4830do	7255do				11765af	11955as	12095af	15280as
0400-0500	Canada, CBC N Quebec Svc	9625do						15310as	15420af	15575as	17760as
0400-0500	Canada, CFRX Toronto	6070do					17790as	21660as			
0400-0500	Canada, CFVP Calgary	6030do				0400-0500	UK, Merlin Network One	3985eu			
0400-0500	Canada, CHNX Halifax	6130do				0400-0500	Ukraine, R Ukraine Intl	4820eu	6020eu	6080eu	7205eu
0400-0500	Canada, CKZN St John's	6160do						7420eu	9560eu		
0400-0500	Canada, CKZU Vancouver	6160do				0400-0500	USA, KAU Dallas TX	5810na			
0400-0429	Canada, R Canada Intl	6150me	9505me	9645me		0400-0500	USA, KTBH Salt Lk City UT	7510am			
0400-0500 vl	Cent Afr Rep, R Minurca	5900af				0400-0500	USA, KVOH Los Angeles CA	9975am			
0400-0500 vl	Chile, R Voz Cristiana	6070am	11690am	11745an	15375am	0400-0500	USA, KWHR Naalehu HI	17780as			
0400-0456	China, China Radio Intl	9730am				0400-0500	USA, Voice of America	6035af	6080af	7170af	7290af
0400-0500	Costa Rica, RF Peace Intl	6975am						7415af	9575af	9775af	
0400-0405	Croatia, Croatian Radio	6130na				0400-0500	USA, WEWN Birmingham AL	5825va			
0400-0500	Cuba, Radio Havana	6000na	9820na	13605na		0400-0500 stwhfa	USA, WGTG McCaysville GA	5085am	6890na		
0400-0427	Czech Rep, R Prague Intl	9955na				0400-0500	USA, WHRA Greenbush ME	7385af			
0400-0500	Ecuador, HCJB	9745na	12015na	21455va		0400-0500	USA, WHRI Noblesville IN	5755am	7315am		
0400-0450	Germany, Deutsche Welle	6015af	6065af	7225af	7280af	0400-0500	USA, WJCR Upton KY	7490na	13595as		
		9565af				0400-0500 mtwhfa	USA, WMLK Bethel PA	9465va			
0400-0500	Germany, Overcomer Minist	9695as				0400-0500	USA, WRMI/R Miami Intl	9955sa			
0400-0500	Guyana, GBC/Voice of	3290do	5950do			0400-0500	USA, WRNO New Orleans LA	7395am			
0400-0500	Ireland, Unt Christian BC	6200do				0400-0500	USA, WSHB Cypress Crk SC	7535eu	12020af		
0400-0500 as/vl	Italy, IRRS	7120va				0400-0500	USA, WWCR Nashville TN	2390na	3215na	5070na	5935na
0400-0500	Kenya, Kenya BC Corp	4885do	4935do			0400-0445	USA, WYFR Okeechobee FL	6065na	9505na	9985eu	
0400-0500 vl	Lesotho, Radio	4800do				0400-0425	Vietnam, Voice of	5940na	7270na	7400na	
0400-0410 vl/m-f	Malawi, MBC	5993do				0400-0500	Zambia, Christian Voice	3330af	6065af		
0400-0500	Malaysia, Radio	7295do				0400-0500	Zambia, Natl BC Corp	6165do	6265do		
0400-0430 mtwhfa	Mexico, Radio Mexico Intl	9705na				0400-0500 vl	Zimbabwe, Zimbabwe BC	3306do	4828do		
0400-0425	Moldova, R Moldova Intl	7500na				0415-0440 vl	Italy, RAI Intl	5975af	7235af		
0400-0500	New Zealand, R NZ Intl	17675pa				0430-0455	Moldova, R Moldova Intl	7500na			
0400-0500 vl	Papua New Guinea, NBC	9675do				0430-0500	Netherlands, Radio	6165na	9590na		
0400-0500	Romania, R Romania Intl	9570na	11940na	15325as	17720as	0430-0500 vl	Nigeria, Radio/Ibadan	6050do			
0400-0500	Russia, Voice of Russia WS	5920na	6065na	7125na	7180na	0430-0500 vl	Nigeria, Radio/Kaduna	3326do			
		9850na	12000na	12020na	13640na	0430-0500	Nigeria, Radio/Lagos	3200af	4775af		
0400-0430 s	Russia, Voice of Russia WS	12060na				0430-0500	Swaziland, Trans World R	3955eu	6180eu	6195eu	9410eu
0400-0430	S Africa, Channel Africa	5955af				0430-0500 mtwhfa	UK, BBC European Service	3955eu	6180eu	6195eu	9410eu
0400-0500	Singapore, R Corp Singapore	6150do				0430-0500 s	USA, WYFR Okeechobee FL	9985eu			
0400-0430	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as		0455-0500	Nigeria, Voice of	7255af	15120va		

SELECTED PROGRAMS

Sundays

- 0400 Radio Mexico Intl: Universal Forum. Interview of a famous Mexican and discussion of his work.
- 0400 USA, WWCR #1 Nashville TN: Watch America. John Pinkston of The Congregation of God Seventh Day with up-to-the-minute Biblical insights on world news and prophetic events.
- 0400 USA, WWCR #3 Nashville TN: Signs of the Times. Rod Lewis.
- 0430 Netherlands, Radio: News. See S 0030.
- 0430 USA, WWCR #1 Nashville TN: Banner of Truth. Cornelius (Neil) Prunk is the radio pastor.
- 0438 Netherlands, Radio: Europe Unzipped. See S 0038.
- 0445 USA, WWCR #1 Nashville TN: A Study in God's Word. From North Carolina, Hezekiah Smith reads Scripture.
- 0454 Netherlands, Radio: Weekend. See S 0054.

Mondays

- 0400 USA, WWCR #1 Nashville TN: Christ Kingdom Ministries. William Smith.
- 0400 USA, WWCR #3 Nashville TN: Mike Jarmus Program (hour 2) (live). See Nam 0300.
- 0430 Netherlands, Radio: News. See S 0030.
- 0430 USA, WWCR #1 Nashville TN: Shepherd's Voice Ministry. William Winter.
- 0436 Netherlands, Radio: Sincerely Yours. See S 1138.
- 0455 Netherlands, Radio: Sounds Interesting. See S 1153.

Tuesdays

- 0400 Radio Mexico Intl: Antenna Radio Summary. See M 1500.
- 0400 USA, WWCR #1 Nashville TN: Lyon Gold and Silver Magnet Program (live). See Nam 0530.
- 0400 USA, WWCR #3 Nashville TN: Scriptures for America (live). Peter J. Peters hosts this outreach ministry of the LaParte Church of Christ in Colorado.
- 0430 Netherlands, Radio: News. See S 0030.
- 0430 USA, WWCR #1 Nashville TN: The Prophecy Club. Stan Johnson discusses bible prophecy from Topeka, Kansas.
- 0439 Netherlands, Radio: Newsline. See M 1138.
- 0453 Netherlands, Radio: Research File. See M 1153.

Wednesdays

- 0400 Radio Mexico Intl: Antenna Radio Summary. See M 1500.
- 0400 USA, WWCR #1 Nashville TN: Total Wellness Show (live). Grant Gerondale.

- 0400 USA, WWCR #3 Nashville TN: Scriptures for America (live). See Nam 0400.
- 0430 Netherlands, Radio: News. See S 0030.
- 0430 USA, WWCR #1 Nashville TN: The Prophecy Club. See Nam 0430.
- 0439 Netherlands, Radio: Newsline. See M 1138.
- 0455 Netherlands, Radio: Music 52-15. See T 1153.

Thursdays

- 0400 Radio Mexico Intl: Antenna Radio Summary. See M 1500.
- 0400 USA, WWCR #1 Nashville TN: Total Wellness Show (live). See Nam 0400.
- 0400 USA, WWCR #3 Nashville TN: Scriptures for America (live). See Nam 0400.
- 0430 Netherlands, Radio: News. See S 0030.
- 0430 USA, WWCR #1 Nashville TN: The Prophecy Club. See Nam 0430.
- 0439 Netherlands, Radio: Newsline. See M 1138.
- 0453 Netherlands, Radio: Documentary. See W 1153.

Fridays

- 0400 Radio Mexico Intl: Antenna Radio Summary. See M 1500.
- 0400 USA, WWCR #1 Nashville TN: Total Wellness Show (live). See Nam 0400.
- 0400 USA, WWCR #3 Nashville TN: Scriptures for America (live). See Nam 0400.
- 0430 Netherlands, Radio: News. See S 0030.
- 0430 USA, WWCR #1 Nashville TN: The Prophecy Club. See Nam 0430.
- 0439 Netherlands, Radio: Newsline. See M 1138.
- 0453 Netherlands, Radio: Media Network. See H 1153.

Saturdays

- 0400 Radio Mexico Intl: Antenna Radio Summary. See M 1500.
- 0400 USA, WWCR #3 Nashville TN: Health Programming (live). Various hosts.
- 0430 Netherlands, Radio: News. See S 0030.
- 0430 USA, WWCR #1 Nashville TN: The Prophecy Club. See Nam 0430.
- 0439 Netherlands, Radio: Newsline. See M 1138.
- 0453 Netherlands, Radio: A Good Life. See T 1253.

HAUSER'S HIGHLIGHTS

GHANA: GHANA BROADCASTING CORP

According to GBC, latest schedule is:

Radio One:

4915 kHz 0530-0900, 1200-0000 UTC

Radio Two:

3366 kHz 0530-0900, 1700-0000 UTC

6130 kHz 0900-1700 UTC

These are regional services for West Africa (via Hans Johnson (c) *Cumbre DX*)

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FREQUENCIES

0500-0600	Anguilla, Caribbean Beacon	6090am			
0500-0600 vl	Australia, ABC/Katherine	5025do			
0500-0600 vl	Australia, ABC/Tent Creek	4910do			
0500-0600	Australia, Radio	9660pa	12080as	15240pa	15510pa
		17715pa	21820pa		
0500-0600 vl	Botswana, Radio	4820do	4830do	7255do	
0500-0600	Canada, CBC N Quebec Svc	9625do			
0500-0600	Canada, CFRX Toronto	6070do			
0500-0600	Canada, CFVP Calgary	6030do			
0500-0600	Canada, CHNX Halifax	6130do			
0500-0600	Canada, CKZU Vancouver	6160do			
0500-0600 vl	Cent Afr Rep, R Minurca	5900af			
0500-0600 vl	Chile, R Voz Cristiana	11690am	15375am		
0500-0556	China, China Radio Intl	9560na			
0500-0600	Costa Rica, RF Peace Intl	6975am	15050am	21460am	
0500-0600	Cuba, Radio Havana	9550na	9820na	9830na	
0500-0600	Ecuador, HCJB	9745na	12015na	21455va	
0500-0550	Germany, Deutsche Welle	6100na	6120na	6185na	11795na
0500-0600	Germany, Overcomer Minist	9695as	13810as		
0500-0600	Guyana, GBC/Voice of	3290do	5950do		
0500-0600	Ireland, Unt Christian BC	6200do			
0500-0515	Israel, Kol Israel	7465eu	9435va	21620va	
0500-0600 as/vl	Italy, IRRS	7120va			
0500-0600	Japan, Radio/NHK	6110na	7230eu	9835na	11715as
		11760as	11840as	11850pa	15230pa
		15590as			
0500-0600	Kenya, Kenya BC Corp	4885do	4935do		
0500-0600	Kuwait, Radio	15110as			
0500-0600 vl	Lesotho, Radio	4800do			
0500-0600	Liberia, LCN/R Liberia Intl	5100do			
0500-0510 vl/m-f	Malawi, MBC	5993do			
0500-0600	Malaysia, Radio	7295do			
0500-0600	Malaysia, RTM Sarawak	7160do			
0500-0600	Malaysia, Voice of	6175as	9750as	15295au	
0500-0530	Mexico, Radio Mexico Intl	9705as			
0500-0600 vl	Namibia, NBC	3270af	3289af		
0500-0525	Netherlands, Radio	6165na	9590na		
0500-0600	New Zealand, R NZ Intl	17675pa			
0500-0600 vl	Nigeria, Radio/Ibadan	6050do			
0500-0600 vl	Nigeria, Radio/Kaduna	4770do			
0500-0600	Nigeria, Radio/Lagos	3326do			
0500-0600	Nigeria, Voice of	7255af	15120va		
0500-0600	North Korea, R Pyongyang	3560as	11710eu	13790as	
0500-0600 vl	Papua New Guinea, NBC	9675do			
0500-0600	Russia, Voice of Russia WS	5920na	6065na	7125na	7180na
		9850na	12000na	12020na	13640na
0500-0530	S Africa, AWR Africa	5960af	6100af		
0500-0530	S Africa, Channel Africa	15215af			
0500-0600	Singapore, R Corp Singapore	6150do			
0500-0600 vl	Solomon Islands, SIBC	5020do			
0500-0600	Spain, R Exterior Espana	6055am			
0500-0600	Swaziland, Trans World R	3200af	4775af		
0500-0530	Switzerland, Swiss R Intl	6165eu			
0500-0600	Uganda, Radio	4976do			
0500-0600	UK, BBC World Service	5975am	6005af	6175am	6180eu
		6190af	6195eu	7160af	9410eu
		9740as	11760me	11765af	11955pa
		12095eu	15280as	15310as	15360as
		15420af	15575as	17640af	17760as
		17885af	21660as		
		3985eu	9895eu		
17790as	USA, Merlin Network One	5810na			
0500-0600	USA, KALJ Dallas TX	7510am			
0500-0600	USA, KTN Salt Lk City UT	9975am			
0500-0600	USA, KVOH Los Angeles CA	17780as			
0500-0600	USA, KWHR Naalehu HI	5970af	6035af	6080af	7170af
0500-0600	USA, Voice of America	7295af	9700af	9775af	11825af
		12080af	15205me		
0500-0600	USA, WBCQ Monticello ME	7415na			
0500-0600 stwhfa	USA, WGTG McCaysville GA	5085am	6890na		
0500-0600	USA, WHRA Greenbush ME	7435af			
0500-0600	USA, WHRI Noblesville IN	5755am	7315am		
0500-0600	USA, WJCR Upton KY	7490na	13595as		
0500-0600 mtwhfa	USA, WMLK Bethel PA	9465va			
0500-0600 stthwhfa	USA, WRMI/R Miami Intl	9955sa			
0500-0600	USA, WRNO New Orleans LA	7395am			
0500-0600	USA, WSHB Cypress Crk SC	7535eu	9835af	12020af	
0500-0505 mtwhf	USA, WWCR Nashville TN	3215na			
0500-0600	USA, WYFR Okeechobee FL	5985na	9985eu	11550eu	
0500-0530	Vatican State, Vatican R	7360af	9660af	11625af	
0500-0600	Zambia, Christian Voice	3330af	6065af		
0500-0600	Zambia, Natl BC Corp	6165do	6265do		
0500-0530 vl	Zimbabwe, Zimbabwe BC	3306do	4828do		
0505-0600	Swaziland, Trans World R	4775af	9500af		
0505-0600	USA, WWCR Nashville TN	2390na	3210na	5070na	5935na
0530-0600	Austria, R Austria Intl	6015na	6155eu	13730eu	15410me
		17870me			
0530-0600 vl	Ghana, Ghana BC Corp	3366do	4915do		
0530-0600 a	Kyrgyzstan, Kyrgyz Radio	4010do	4050do		
0530-0600	Thailand, Radio	9655eu	11905eu	15115eu	
0530-0600	UAE, Radio Dubai	17830eu	21605eu		
0530-0600 mtwhf	UK, BBC European Service	3955eu	6180eu	6195eu	9410eu
		12095eu	3955eu	6180eu	6195eu
0530-0600 as	UK, BBC World Service	12095eu			
0530-0600 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		

SELECTED PROGRAMS

Sundays

0500	Israel, Kol Israel: News. World and regional news.
0500	USA, WWCR #1 Nashville TN: The Extraordinary Science Hour. J.W. McGinnis of the Tesla Society.
0500	USA, WWCR #3 Nashville TN: The Bible's Greatest Heroes. Sound tracks from animated Bible stories.
0511	Israel, Kol Israel: Review of the Paper Press. A summary of items in the Israeli newspapers.
0530	Austria, R Austria Intl: News from Vienna. See S 0030.
0530	UK, BBC London (AE): Women Who Dared to Speak. The voices of the few who have risked everything to speak out and protest against the injustices suffered by their sex.
0530	UK, BBC London (AF): Agenda. See S 0230.
0533	Austria, R Austria Intl: Report from Austria. See S 0033.
0537	Austria, R Austria Intl: Postbox. See S 0137.

Mondays

0500	Israel, Kol Israel: News. See S 0500.
0500	USA, WWCR #1 Nashville TN: Truth Shall Make You Free. Otis Bonds.
0500	USA, WWCR #3 Nashville TN: Watch America. See Nam 0400.
0511	Israel, Kol Israel: Review of the Paper Press. See S 0511.
0530	Austria, R Austria Intl: News from Vienna. See S 0030.
0530	USA, WWCR #1 Nashville TN: Lyon Gold and Silver Magnet Program (repeat). Lew Lyon hawks a variety of products for healing.
0530	USA, WWCR #3 Nashville TN: The Old Record Shop. Ken Berryhill with thirty minutes of selections of music from the days of the 78 rpm record. Recommended.
0533	Austria, R Austria Intl: Report from Austria. See S 0033.

Tuesdays

0500	Israel, Kol Israel: News. See S 0500.
0500	Radio Mexico Intl: Eternally Mexico. See S 1600.
0500	USA, WWCR #1 Nashville TN: USA Radio News. See Nam 1200.
0500	USA, WWCR #3 Nashville TN: Scriptures for America (live). See Nam 0400.
0505	USA, WWCR #1 Nashville TN: Sweet Liberty (live). Jackie Patru host this talk radio program.

0511	Israel, Kol Israel: Review of the Paper Press. See S 0511.
0530	Austria, R Austria Intl: News from Vienna. See S 0030.
0533	Austria, R Austria Intl: Report from Austria. See S 0033.

Wednesdays

0500	Israel, Kol Israel: News. See S 0500.
0500	USA, WWCR #1 Nashville TN: USA Radio News. See Nam 1200.
0500	USA, WWCR #3 Nashville TN: Scriptures for America (live). See Nam 0400.
0505	USA, WWCR #1 Nashville TN: Sweet Liberty (live). See Nam 0505.
0511	Israel, Kol Israel: Review of the Paper Press. See S 0511.
0530	Austria, R Austria Intl: News from Vienna. See S 0030.
0533	Austria, R Austria Intl: Report from Austria. See S 0033.

Thursdays

0500	Israel, Kol Israel: News. See S 0500.
0500	Radio Mexico Intl: Mirror of Mexico. See S 1500.
0500	USA, WWCR #1 Nashville TN: USA Radio News. See Nam 1200.
0500	USA, WWCR #3 Nashville TN: Scriptures for America (live). See Nam 0400.
0505	USA, WWCR #1 Nashville TN: Sweet Liberty (live). See Nam 0505.
0511	Israel, Kol Israel: Review of the Paper Press. See S 0511.
0530	Austria, R Austria Intl: News from Vienna. See S 0030.
0533	Austria, R Austria Intl: Report from Austria. See S 0033.

Fridays

0500	Israel, Kol Israel: News. See S 0500.
0500	Radio Mexico Intl: The Sounds of Mexico. See S 1600.
0500	USA, WWCR #1 Nashville TN: USA Radio News. See Nam 1200.
0500	USA, WWCR #3 Nashville TN: Scriptures for America (live). See Nam 0400.
0505	USA, WWCR #1 Nashville TN: Sweet Liberty (live). See Nam 0505.
0511	Israel, Kol Israel: Review of the Paper Press. See S 0511.
0530	Austria, R Austria Intl: News from Vienna. See S 0030.
0533	Austria, R Austria Intl: Report from Austria. See S 0033.

Saturdays

0500	Israel, Kol Israel: News. See S 0500.
0500	Radio Mexico Intl: Mail Box. See W 1600.
0500	USA, WWCR #1 Nashville TN: USA Radio News. See Nam 1200.

0500	USA, WWCR #3 Nashville TN: Health Programming (live). See Nam 0400.
0505	USA, WWCR #1 Nashville TN: Point of View. See Nam 1205.
0530	Austria, R Austria Intl: News from Vienna. See S 0030.
0530	UK, BBC London (AE): My Century. NEW! The weekend (30-minute) version of the program described in T 0055.
0533	Austria, R Austria Intl: Report from Austria. See S 0033.

HAUSER'S HIGHLIGHTS

CHINA: CHINA RADIO INTERNATIONAL

CRI via Mali relay new sked:

UTC	Lang	Freq kHz
1600-1657	Arabic	15125 13685
1700-1727	Swahili	15125 11970
1730-1827	Hausa	15125 11970
1830-1927	Arabic	15530 13685
1930-1957	Portuguese	15500 11975
2000-2127	English	15500 11975
2130-2227	French	15500 11975
2230-2257	Chinese	15500 11975
2300-2357	Chinese	11975

(Electronic DX Press)

0600-0630	S Africa, Channel Africa	15215af		
0600-0635	S Africa, Trans World R	11735af		
0600-0700	Singapore,RCorp Singapore	6150do		
0600-0700 vl	Solomon Islands, SIBC	5020do		
0600-0700	UK, BBC World Service	3955seu	5975am	6005af
		6180eu	6190af	6195seu
		7160af	7325seu	9410eu
		11760me	11765af	11950seu
		12095seu	15310as	15360as
		15575as	17640af	17760as
	15565eu	17885af	21660as	
	17790as	6110eu	7320pa	
0600-0700	UK, Merlin Network One	5810na		
0600-0700	USA, KALJ Dallas TX	7510am		
0600-0700	USA, KTVN Salt Lk City UT	17780as		
0600-0700	USA, KWHR Naalehu HI	5970af	6035af	6080af
0600-0630	USA, Voice of America	7285af	11805af	11825seu
		12080af	15205me	15600af
		7415na		
0600-0700	USA, WBCQ Monticello ME	5825va		
0600-0700	USA, WEWN Birmingham AL	7435af		
0600-0700	USA, WHRA Greenbush ME	5755am	7315am	
0600-0700	USA, WHRI Noblesville IN	11950am		
0600-0700	USA, WINB Red Lion PA	7490na	13595as	
0600-0700	USA, WJCR Upton KY	9465va		
0600-0700 mtwhfa	USA, WMLK Bethel PA	7395am		
0600-0700	USA, WRNO New Orleans LA	7535af	9835seu	
0600-0700	USA, WSHB Cypress Crk SC	2390na	3210na	5070na
0600-0700	USA, WWCR Nashville TN	5985na	7355seu	5935na
0600-0700 vl	USA, WYFR Okeechobee FL	4960do		
0600-0700 vl	Vanuatu, Radio	4005seu	5880eu	7250eu
0600-0620	Vatican State, Vatican R	9780do		
0600-0700	Yemen, Radio Aden	3330af	6065af	
0600-0700	Zambia, Christian Voice	6165do	6265do	
0600-0700 vl	Zimbabwe, Zimbabwe BC	4828do	5012do	
0605-0700	Swaziland, Trans World R	6100af	9500af	
0630-0700	Austria, R Austria Intl	6015na		
0630-0700 mtwhfa	Malta, VO Mediterranean	7155seu		
0630-0700	Switzerland, Swiss R Intl	6165seu		
0630-0700 mtwhf	UK, BBC European Service	3955seu	6195seu	
0630-0700 as	UK, BBC World Service	3955seu	6195seu	
0630-0700	USA, Voice of America	5995af	7170af	11825seu
		15205me		11950af
0630-0700 as	USA, Voice of America	5970af	6035af	6080af
		11805af	12080af	15600af
0630-0645	Vatican State, Vatican R	9660af	11625af	13765af
0641-0656	Romania, R Romania Intl	9550seu	9625seu	9665seu
				11885seu

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FREQUENCIES

0700-0800	Anguilla, Caribbean Beacon	6090am			
0700-0800 vl	Australia, ABC/Katherine	5025do			
0700-0800 vl	Australia, ABC/Tent Creek	4910do			
0700-0800	Australia, Radio	9660pa	12080as	15240pa	15415as
		15510pa	17715pa	17750as	21725pa
		4820do	4830do	7255do	
0700-0800 vl	Botswana, Radio				
0700-0800	Canada, CFRX Toronto	6070do			
0700-0800	Canada, CFVP Calgary	6030do			
0700-0800	Canada, CHNX Halifax	6130do			
0700-0800	Canada, CKZU Vancouver	6160do			
0700-0800 vl	Cent Afr Rep, R Minurca	9500af			
0700-0800 vl	Chile, R Voz Cristiana	11690am			
0700-0800	Costa Rica, RF Peace Intl	6975am	15050am	21460am	
0700-0800	Ecuador, HCJB	9640pa	9775eu	21455va	
0700-0800 as/vl	Eqt Guinea, R East Africa	15186af			
0700-0800 mtwhf	Eqt Guinea, Radio Africa	15186af			
0700-0800	Germany, Sunrise Radio	6110va			
0700-0800	Germany, Voice of Hope	5975eu			
0700-0800 s	Germany, Good News World R	13740as			
0700-0800	Germany, Overcomer Ministr	13810as			
0700-0800 vl	Ghana, Ghana BC Corp	3366do	4915do		
0700-0715 f	Greece, Voice of	7430eu	7450eu	9375eu	9420eu
		9775au			
0700-0800	Guyana, GBC/Voice of	3290do	5950do		
0700-0800	Ireland, Unt Christian BC	6200do			
0700-0730 vl	Italy, IRRS	3985va			
0700-0800	Kenya, Kenya BC Corp	4885do	4935do		
0700-0800	Kuwait, Radio	15110as			
0700-0800 vl	Lesotho, Radio	4800do			
0700-0800	Liberia, Radio Veritas	5470do			
0700-0715	Liberia, LCN/R Liberia Intl	5100do			
0700-0800	Malaysia, Radio	7295do			
0700-0800	Malaysia, RTM Sarawak	7160do			
0700-0800	Malaysia, Voice of	6175as	9750as	15295au	
0700-0800	Myanmar, Radio	9730do			
0700-0715 vl	Namibia, NBC	3270af	3289af		
0700-0705	New Zealand, R NZ Intl	17675pa			
0700-0800 vl	Nigeria, Radio/Ibadan	6050do			
0700-0800 vl	Nigeria, Radio/Kaduna	4770do			
0700-0800 vl	Nigeria, Voice of	7255af	15120va		
0700-0800	Palau, KHBN/Voice of Hope	9965as	9985as	13840as	15725as
0700-0730 vl	Papua New Guinea, NBC	9675do			
0700-0800	Romania, R Romania Intl	17735af	21480af		
0700-0800	Russia, Voice of Russia WS	15460au	15470au	15525au	17495au
		17570au	21790au		
0700-0800	Singapore, RCorp Singapore	6150do			
0700-0730	Slovakia, R Slovakia Intl	11990au	15460au	21705au	
0700-0800 vl	Solomon Islands, SIBC	5020do			
0700-0705	Swaziland, Trans World R	4775af	6100af	9500af	
0700-0800	Taiwan, Radio Taipei Intl	5950na			
0700-0800	UK, BBC World Service	5975am	6005af	6175am	6180eu
		6190af	6195eu	7145pa	7325eu
		11760me	11765af	11835af	11940af
		1531015	15360as	15485eu	15565eu
		17760as	17790as	17830af	21660as
				17885af	
0700-0800 as	UK, BBC World Service	6110eu	9915eu	13720pa	17630eu
0700-0800	UK, Merlin Network One	21550af			
0700-0800	USA, KAU Dallas TX	5810na			
0700-0800	USA, KTBN Salt Lk City UT	7510am			
0700-0800	USA, KWHR Naalehu HI	11565as	17780as		
0700-0800	USA, WBCQ Monticello ME	7415na			
0700-0800	USA, WEWN Birmingham AL	5825na			
0700-0800	USA, WHRA Greenbush ME	7435af			
0700-0800	USA, WHRI Noblesville IN	5755am	7315am		
0700-0800	USA, WINB Red Lion PA	11950am			
0700-0800	USA, WJCR Upton KY	7490na	13595as		
0700-0800 mtwhfa	USA, WMLK Bethel PA	9465va			
0700-0800	USA, WRNO New Orleans LA	7395am			
0700-0800	USA, WSHB Cypress Crk SC	7535af	9835eu		
0700-0800	USA, WWCN Nashville TN	2390na	3210na	5070na	5935na
0700-0745	USA, WYFR Okeechobee FL	7355eu	9455va	9985eu	
0700-0800 vl	Vanuatu, Radio	4960do			
0700-0800	Zambia, Christian Voice	6065af			
0700-0800	Zambia, Natl BC Corp	6165do	6265do		
0700-0800 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
0705-0710 mtwhfa	Croatia, Croatian Radio	6235eu	7305eu	9830eu	13820au
0706-0800	New Zealand, R NZ Intl	9700pa			
0710-0715 s	Kyrgyzstan, Kyrgyz Radio	4010do	4050do		
0715-0800 vl	Namibia, NBC	6060af	6175af		
0730-0800	Finland, YLE/R Finland	9840va	21670as		
0730-0800	Georgia, Georgian Radio	11910eu			
0730-0740	Greece, Voice of	7430eu	7450eu	9375eu	9420na
		9775au			
0730-0800 as/vl	Italy, IRRS	3985va			
0730-0800 vl	Papua New Guinea, NBC	4890do			
0730-0800	Switzerland, Swiss R Intl	9885af	11860af	13635af	
0730-0745 mtwhf	Vatican State, Vatican R	4005va	5880va	6185va	7250va
		9645va	11740va	15595va	

0740-0800	Guam, TWR/KTWR	15200as
0745-0800 s	Albania, Trans World R	9685eu
0745-0755 as	Monaco, Trans World Radio	9870eu
0755-0800 mtwhf	Monaco, Trans World Radio	9870eu

0800 UTC

0800-0900	Albania, Trans World R	9685eu			
0800-0900	Anguilla, Caribbean Beacon	6090am			
0800-0830 vl	Australia, ABC/Katherine	5025do			
0800-0830 vl	Australia, ABC/Tent Creek	4910do			
0800-0900	Australia, Radio	9580pa	9710pa	12080as	
		15415as	15510pa	17750as	21725pa
		4820do	4830do	7255do	
0800-0900 vl	Botswana, Radio				
0800-0900 vl	Canada, CBC N Quebec Svc	9625do			
0800-0900	Canada, CFRX Toronto	6070do			
0800-0900	Canada, CFVP Calgary	6030do			
0800-0900	Canada, CHNX Halifax	6130do			
0800-0900	Canada, CKZU Vancouver	6160do			
0800-0900 vl	Cent Afr Rep, R Minurca	9500af	9900af		
0800-0900 vl	Chile, R Voz Cristiana	11890am			
0800-0900	Costa Rica, RF Peace Intl	6975am	15050am	21460am	
0800-0827	Czech Rep, R Prague Intl	11640eu	15260eu		
0800-0900	Ecuador, HCJB	9640pa	9775eu	21455va	
0800-0900 as/vl	Eqt Guinea, R East Africa	15186af			
0800-0900 mtwhf	Eqt Guinea, Radio Africa	15186af			
0800-0900	Germany, Sunrise Radio	6110va			
0800-0900	Germany, Voice of Hope	5975eu			
0800-0900	Germany, Overcomer Ministr	13810as			
0800-0900	Guam, TWR/KTWR	15200as	15330as		
0800-0900	Guyana, GBC/Voice of	3290do	5950do		
0800-0900	Indonesia, Voice of	9525as	11765as	15510as	
0800-0900	Ireland, Unt Christian BC	6200do			
0800-0830 as/vl	Italy, IRRS	3985va			
0800-0900	Kenya, Kenya BC Corp	4885do	4935do		
0800-0900 vl	Lesotho, Radio	4800do			
0800-0900	Liberia, Radio Veritas	5470do			
0800-0900	Liberia, LCN/R Liberia Intl	5100do			
0800-0900	Malaysia, Radio	7295do			
0800-0830	Malaysia, Voice of	6175as	9750as	15295au	
0800-0900 vl	Malaysia, RTM Kota Kinabalu	5980do			
0800-0900	Monaco, Trans World Radio	9870eu			
0800-0830	Myanmar, Radio	9730do			
0800-0900	N Mariana Is, KHBI Saipan	15665eu			
0800-0900 vl	Namibia, NBC	6060af	6175af		
0800-0900	New Zealand, R NZ Intl	9700pa			
0800-0900 vl	Nigeria, Radio/Ibadan	6050do			
0800-0900 vl	Nigeria, Radio/Kaduna	4770do			
0800-0900	Nigeria, Radio/Lagos	3326do			
0800-0900	Palau, KHBN/Voice of Hope	9985as	13840as	15725as	
0800-0900 vl	Papua New Guinea, NBC	4890do			
0800-0900	Russia, Voice of Russia WS	9905au	15470au	15525au	17495au
		21790au			
0800-0900	Singapore, RCorp Singapore	6150do			
0800-0900	South Korea, R Korea Intl	9570au	13670eu		
0800-0900	UK, BBC World Service	7145pa	7325eu	9410eu	9740as
		11940af	11955pa	12095eu	15310as
		15485eu	15565eu	17640eu	17760as
		21660as			
0800-0900 as	UK, BBC World Service	15575as	17885af		
0800-0900	UK, Merlin Network One	9915eu	13660eu	13720pa	17630eu
		21550af			
0800-0900	USA, KAU Dallas TX	5810na			
0800-0900	USA, KNLS Anchor Point AK	7365as			
0800-0900	USA, KTBN Salt Lk City UT	7510am			
0800-0900	USA, KWHR Naalehu HI	9930as	11565as		
0800-0900	USA, WBCQ Monticello ME	7415na			
0800-0900	USA, WEWN Birmingham AL	5825va			
0800-0900	USA, WHRI Noblesville IN	5755am	7315am		
0800-0900 sm	USA, WHRI Noblesville IN	5755am			
0800-0900	USA, WJCR Upton KY	7490na	13595as		
0800-0900 mtwhfa	USA, WMLK Bethel PA	9465va			
0800-0900	USA, WRNO New Orleans LA	7395am			
0800-0900	USA, WSHB Cypress Crk SC	7535eu	9835eu	9845au	
0800-0900	USA, WWCN Nashville TN	2390na	3210na	5070na	5935na
0800-0900 vl	Vanuatu, Radio	4960do			
0800-0900	Zambia, Christian Voice	6065af			
0800-0900	Zambia, Natl BC Corp	6165do	6265do		
0800-0900	Zimbabwe, Zimbabwe BC	4828do	5012do		
0805-0810 s	Croatia, Croatian Radio	6165eu	7185eu	9830eu	13820af
0805-0810	Pakistan, Radio	11975as	15485as		
0815-0900 f	Seychelles, FEBA Radio	15540as			
0830-0900 vl	Australia, ABC/Alice Spgs	2310do			
0830-0900 vl	Australia, ABC/Katherine	2485do			
0830-0900 vl	Australia, ABC/Tent Creek	2325do			
0830-0900	Austria, R Austria Intl	6155eu	13730eu	17615as	21765au
0830-0856	Belgium, R Vlaanderen Intl	9925eu	9940au		
0830-0900 as/vl	Italy, IRRS	7120va			
0830-0900 vl	Solomon Islands, SIBC	5020do			
0830-0900	Switzerland, Swiss R Intl	9885as	13685as		

FREQUENCIES

0900-0920	Albania, Trans World R	9685eu				1000-1100	Anguilla,Caribbean Beacon	11775am			
0900-1000	Anguilla,Caribbean Beacon	6090am				1000-1030	Armenia, Voice of	4810eu	15270eu		
0900-1000 vl	Australia, ABC/Alice Spgs	2310do				1000-1100 vl	Australia, ABC/Alice Spgs	2310do			
0900-1000 vl	Australia, ABC/Katherine	2485do				1000-1100 vl	Australia, ABC/Katherine	2485do			
0900-1000 vl	Australia, ABC/Tent Creek	2325do				1000-1100 vl	Australia, ABC/Tent Creek	2325do			
0900-1000	Australia, Radio	6080as	9580pa	11880as	17750as	1000-1100	Australia, Radio	6080as	9580pa	11880as	17750as
0900-1000 vl	Botswana, Radio	4820do	4830do	7255sk		1000-1100 vl	Botswana, Radio	4820do	4830do	7255do	
0900-1000	Canada, CFRX Toronto	6070do				1000-1100 vl	Canada, CBC N Quebec Svc	9625do			
0900-1000	Canada, CFVP Calgary	6030do				1000-1100	Canada, CFRX Toronto	6070do			
0900-1000	Canada, CHNX Halifax	6130do				1000-1100	Canada, CFVP Calgary	6030do			
0900-1000	Canada, CKZU Vancouver	6160do				1000-1100	Canada, CHNX Halifax	6130do			
0900-1000 vl	Cent Afr Rep, R Minurca	9500af	9900af			1000-1100	Canada, CKZN St John's	6160do			
0900-1000 vl	Chile, R Voz Cristiana	6070am	11890am			1000-1100	Canada, CKZU Vancouver	6160do			
0900-0956	China, China Radio Intl	15210pa				1000-1100 vl	Cent Afr Rep, R Minurca	9500af	9900af		
0900-1000	Costa Rica,RF Peace Intl	6975am	15050am	21460am		1000-1100 vl	Chile, R Voz Cristiana	6070am	11890am	15375am	
0900-1000	Ecuador, HCJB	9640pa	21455va			1000-1056	China, China Radio Intl	15210pa	17755pa		
0900-1000 as/vl	Eqt Guinea, R East Africa	15186af				1000-1100	Costa Rica,RF Peace Intl	6975am	15050am	21460am	
0900-1000 mtwhf	Eqt Guinea, Radio Africa	15186af				1000-1030	Czech Rep, R Prague Intl	17485af	21745as		
0900-0950	Germany, Deutsche Welle	6160as	9565af	11775as	12055as	1000-1100	Ecuador, HCJB	9640pa	21455va		
		15145af	15410af	17800af	17820as	1000-1100 as/vl	Eqt Guinea, R East Africa	15186af			
		21600af				1000-1100 mtwhf	Eqt Guinea, Radio Africa	15186af			
0900-1000	Germany, Sunrise Radio	6110va				1000-1100	Germany, Sunrise Radio	6110va			
0900-1000	Germany, Voice of Hope	5975eu				1000-1100	Germany, Voice of Hope	5975eu			
0900-1000	Germany,Overcomer Ministr	5965eu	13810as			1000-1100 a	Germany,Good News World R	5910eu			
0900-1000 vl	Ghana, Ghana BC Corp	4915do	6130do			1000-1100	Germany,Overcomer Ministr	5965eu	13810as		
0900-0915	Guam, TWR/KTWR	15200as	15330as			1000-1100 vl	Ghana, Ghana BC Corp	4915do	6130do		
0900-1000	Guyana, GBC/Voice of	3290do	5950do			1000-1030	Guam, AWR/KSDA	11660as			
0900-1000	Ireland, Unt Christian BC	6200do				1000-1100	Guam, TWR/KTWR	9865as			
0900-1000 as/vl	Italy, IRRS	7120va				1000-1100	Guyana, GBC/Voice of	3290do	5950do		
0900-1000	Kenya, Kenya BC Corp	4935do				1000-1100	India, All India Radio	11585as	13700as	15040as	17387au
0900-1000 vl	Lesotho, Radio	4800do						17840as			
0900-1000	Liberia, Radio Veritas	5470do				1000-1100	Ireland, Unt Christian BC	6200do			
0900-0915	Liberia,LCN/R Liberia Int	5100do				1000-1100 as/vl	Italy, IRRS	7120va			
0900-1000	Malaysia, Radio	7295do				1000-1100	Japan, Radio/NHK	9695as	11850pa	15590as	
0900-1000 vl	Malaysia,RTM KotaKinabalu	5980do				1000-1100	Kenya, Kenya BC Corp	4935do			
0900-1000 s	Malta, VO Mediterranean	11770eu	11830eu			1000-1100 vl	Lesotho, Radio	4800do			
0900-0950 s	Monaco, Trans World Radio	9870eu				1000-1100	Malaysia, Radio	7295do			
0900-1000 twthfas	N Mariana Is, KHBI Saipan	9355as	15665as			1000-1100 vl	Malaysia,RTM KotaKinabalu	5980do			
0900-1000 vl	Namibia, NBC	6060af	6175af			1000-1030 s	Malta, VO Mediterranean	11770eu	11830eu		
0900-1000	New Zealand, R NZ Intl	9700pa				1000-1100 twthfas	N Mariana Is, KHBI Saipan	9355as	15665as		
0900-1000 vl	Nigeria, Radio/Ibadan	6050do				1000-1100 vl	Namibia, NBC	6060af	6175af		
0900-1000 vl	Nigeria, Radio/Kaduna	4770do				1000-1100	Netherlands, Radio	7260as	9820au	12065as	
0900-1000	Nigeria, Radio/Lagos	3326do				1000-1015	New Zealand, R NZ Intl	9700pa			
0900-1000 vl	Papua New Guinea, NBC	4890do				1000-1100 vl	Nigeria, Radio/Ibadan	6050do			
0900-1000	Russia,Voice of Russia WS	9905au	15470au	15525au	17495au	1000-1100 vl	Nigeria, Radio/Kaduna	4770do			
0900-1000	Singapore,RCorp Singapore	6150do				1000-1100 vl	Nigeria, Voice of	7255af	15120va		
0900-1000 vl	Solomon Islands, SIBC	5020do				1000-1100 vl	Papua New Guinea, NBC	4890do			
0900-1000	Tanzania, Radio	5050af				1000-1100	Philippines, FEBC/R Intl	11635as			
0900-1000	UK, BBC World Service	6065as	6190af	6195as	9410eu	1000-1030	Singapore, RTE Radio	11740as			
		9580as	9740as	11760me	11765pa	1000-1100	Singapore,RCorp Singapore	6150do			
		11940af	11945as	11955as	12095eu	1000-1100 vl	Solomon Islands, SIBC	5020do			
		15190as	15310as	15360as	15400af	1000-1030	Tanzania, Radio	5050af			
		15485eu	15565eu	15575as	17640eu	1000-1100	UK, BBC World Service	6190af	6195va	9410eu	9740as
		17705eu	17760as	17790as	17830af			11760me	11765pa	11940af	12095eu
		17885af	21660as					15310as	15360pa	15485eu	15565eu
0900-1000	UK, Merlin Network One	9915eu	13660eu	17630eu	21550af			15575as	17640eu	17705eu	17760as
0900-1000	USA, KAJL Dallas TX	5810na						17790as	17885af	21660as	
0900-1000	USA, KTVN Salt Lk City UT	7510am				1000-1100 as	UK, BBC World Service	15190sa	15400af	17830af	
0900-1000	USA, KWHR Naalehu HI	9930as	11565pa			1000-1100	UK, Merlin Network One	9915eu	13660eu	17630eu	21550af
0900-1000	USA, WBCQ Monticello ME	7415na				1000-1100	USA, KAJL Dallas TX	5810na			
0900-1000	USA, WEWN Birmingham AL	5825va				1000-1100	USA, KTVN Salt Lk City UT	7510am			
0900-1000	USA, WHRI Noblesville IN	5755am	7315am			1000-1100	USA, KWHR Naalehu HI	9930as	11565pa		
0900-1000	USA, WJCR Upton KY	7490na	13595as			1000-1100	USA, Voice of America	5985pa	6165ca	7405ca	9590ca
0900-1000	USA, WRNO New Orleans LA	7395am						11720as	15425as		
0900-1000	USA, WSHB Cypress Crk SC	7395sa	7535eu	9455sa	9835eu	1000-1100	USA, WBCQ Monticello ME	7415na			
0900-1000	USA, WWCR Nashville TN	2390na	3210na	5070na	5935na	1000-1100	USA, WEWN Birmingham AL	5825va			
0900-1000	Zambia, Christian Voice	6065af				1000-1100 mtwhfa	USA, WGTG McCaysville GA	9400am			
0900-1000	Zambia, Natl BC Corp	6165do	6265do			1000-1100	USA, WHRI Noblesville IN	6040am	9495am		
0900-1000 vl	Zimbabwe, Zimbabwe BC	4828do	5012do			1000-1100	USA, WJCR Upton KY	7490na	13595as		
0905-0910 s	Croatia, Croatian Radio	6165eu	7185eu	9830eu	13820au	1000-1100	USA, WRNO New Orleans LA	7395am			
0915-0930	Guam, TWR/KTWR	15330as				1000-1100	USA, WSHB Cypress Crk SC	6095am	7395am	9455sa	
0915-0945 as	UK, BBC World Service	6195as	9740as	11765pa	15360pa	1000-1100	USA, WWCR Nashville TN	2390na	3210na	5070na	5935na
		17760as	21660as			1000-1100	USA, WYFR Okeechobee FL	5950na			
						1000-1025	Vietnam, Voice of	5940as	7270as	7400as	9839as
								12019as	15009as		
0920-0935 as	Albania, Trans World R	9685eu				1000-1100	Zambia, Christian Voice	6065af			
0920-0930 t	Kyrgyzstan, Kyrgyz Radio	4010do	4050do			1000-1100	Zambia, Natl BC Corp	6165do	6265do		
0930-1000	Austria, R Austria Intl	17615as	21765au			1000-1100 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
0930-1000	Canada, CKZN St John's	6160do				1000-1100 vl	Croatia, Croatian Radio	6165eu	7185eu	9830eu	
0930-1000	Georgia, Georgian Radio	11910eu				1005-1010 s	New Zealand, R NZ Intl	9700pa			
0930-1000	Guam, TWR/KTWR	9865as				1015-1100 occsnal	Georgia, Georgian Radio	11910eu			
0930-1000	Italy, AWR Europe	7230eu				1030-1100	Guam, AWR/KSDA	11660as	11795as		
0930-1000	Netherlands, Radio	7260as	9820au	12065as		1030-1100	Malaysia, RTM Sarawak	7160do			
0930-1000	Philippines, FEBC/R Intl	11635as				1030-1100	South Korea, R Korea Intl	11715am			
0935-0950 s	Albania, Trans World R	9685eu				1030-1100 as	Tanzania, Radio	5050af			
0945-1000 smtwhf	UK, BBC Slow Speed News	6065as	9580as	11945as	11955as	1030-1100	UAE, Radio Dubai	13675eu	15370eu	15395eu	21605eu
		15280as				1045-1100 mtwhf	USA, WRMI/R Miami Intl	9955am			
0945-1000 a	UK, BBC World Service	6065as	9580as	11945as	11955as						
		15280as									



1100-1200	Anguilla,Caribbean Beacon	11775am				1100-1200	South Korea, R Korea Intl	9650na			
1100-1200 vl	Australia, ABC/Alice Spgs	2310do				1100-1130	Switzerland, Swiss R Intl	9535eu	9540as	17815as	
1100-1200 vl	Australia, ABC/Katherine	2485do				1100-1200	Switzerland, Swiss R Intl	9540as	17815as		
1100-1200 vl	Australia, ABC/Tent Creek	2325do				1100-1200	Taiwan, Voice of Asia	7445as			
1100-1200	Australia, Radio	6080as	9580pa			1100-1200 as	Tanzania, Radio	5050af			
1100-1200 vl	Botswana, Radio	4820do	4830do	7255do		1100-1130 mtwhf	UK, BBC Caribbean Report	6195ca	15220ca		
1100-1200	Canada, CFRX Toronto	6070do				1100-1200	UK, BBC World Service	5965na	6190af	6195as	9410eu
1100-1200	Canada, CFVP Calgary	6030do					9580as	9740as	11760me	11940af	11955as
1100-1200	Canada, CHNX Halifax	6130do					15280as	15310as	15400af	15485eu	15565eu
1100-1200	Canada, CKZN St John's	6160do					17640eu	17705eu	17785as	17790sa	17830af
1100-1200	Canada, CKZU Vancouver	6160do					21660af				
1100-1200 vl	Cent Afr Rep, R Minurca	9500af	9900af			1100-1130 as	UK, BBC World Service	15190am	15220am		
1100-1200 vl	Chile, R Voz Cristiana	6070am	15375am	21500am		1100-1200	UK, Merlin Network One	9915eu	13660eu	17630eu	21550af
1100-1200	Costa Rica,RF Peace Intl	6975am	15050am	21460am		1100-1200	USA, KAU Dallas TX	5810na			
1100-1200	Ecuador, HCJB	12005am	15115am	21455va		1100-1200	USA, KTNB Salt Lk City UT	7510am			
1100-1200 as/vl	Eqt Guinea, R East Africa	15186af				1100-1200	USA, KWHR Naalehu HI	9930as	11565pa		
1100-1150	Germany, Deutsche Welle	15370af	15410af	17780af	17800af	1100-1200	USA, Voice of America	5985pa	6160as	9645as	9760as
1100-1200	Germany, Sunrise Radio	6110va						11705as	11720as	15425as	
1100-1200	Germany,Overcomer Ministr	5965eu	13810as			1100-1130 mtwhf	USA, Voice of America	13675af	15510af	17650af	17750af
1100-1200 vl	Ghana, Ghana BC Corp	4915do	6130do					21705af			
1100-1200	Guyana, GBC/Voice of	3290do	5950do			1100-1200	USA, WEWN Birmingham AL	5825va	7465eu		
1100-1200	Iran, VOIRI	11830as	11875as	13605as	15255as	1100-1200 mtwhfa	USA, WGTG McCaysville GA	9400am			
		17560as				1100-1200	USA, WHRI Noblesville IN	6040am	9495am		
1100-1200	Ireland, Unt Christian BC	6200do				1100-1200	USA, WJCR Upton KY	7490na	13595as		
1100-1200 as/vl	Italy, IRRS	7120va				1100-1200 mtwhfa	USA, WRMI/R Miami Intl	9955am			
1100-1200	Japan, Radio/NHK	6120na	9695as	15590as		1100-1200	USA, WRNO New Orleans LA	7395am			
1100-1200	Jordan, Radio	11690eu				1100-1200	USA, WSHB Cypress Crk SC	6095am	9455am		
1100-1200	Kenya, Kenya BC Corp	4935do				1100-1200	USA, WWCR Nashville TN	2390na	5070na	5935na	
1100-1110 fa	Kyrgyzstan, Kyrgyz Radio	4010do	4050do			1100-1200 mtwhf	USA, WWCR Nashville TN	3210na			
1100-1200 vl	Lesotho, Radio	4800do				1100-1200 as	USA, WWCR Nashville TN	15685na			
1100-1110	Liberia,LCN/R Liberia Int	5100do				1100-1200	USA, WYFR Okeechobee FL	5950na	7355na		
1100-1200	Malaysia, Radio	7295do				1100-1130 mtwhf	Vatican State, Vatican R	5880va	9645va	11740va	15595va
1100-1200 vl	Malaysia,RTM KotaKinabalu	5980do						21850va			
1100-1200 twhf/as	N Mariana Is, KHBI Saipan	9355as	9385pa			1100-1125	Vietnam, Voice of	7285as	9730as		
1100-1200 vl	Namibia, NBC	6060af	6175af			1100-1200	Zambia, Christian Voice	6065af			
1100-1125	Netherlands, Radio	7260as	9820au	12065as		1100-1200	Zambia, Natl BC Corp	6165do	6265do		
1100-1200 occsna	New Zealand, R NZ Intl	9700pa				1100-1200 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
1100-1200 vl	Nigeria, Radio/Ibadan	6050do				1115-1145	Nepal, Radio	3230as	5005as		
1100-1200 vl	Nigeria, Radio/Kaduna	4770do				1130-1156	Belgium, R Vlaanderen Int	9925eu	13745me		
1100-1200 vl	Nigeria, Voice of	7255af	15120va			1130-1157	Czech Rep, R Prague Intl	11640eu	21745af		
1100-1200	North Korea, R Pyongyang	3560as	9975me	11335am	13650va	1130-1135	Israel, Kol Israel	15640eu	17535va		
		15230as				1130-1200 vl	Libya, Voice of Africa	15235va	15415va	15435va	
1100-1120	Pakistan, Radio	15530eu	17835eu			1130-1200	Netherlands, Radio	6045eu	9855eu		
1100-1200	Palau, KHBN/Voice of Hope	9655as	9965as	9985as		1130-1200 mtwhf	UK, BBC World Service	9580as	9740as	11955as	15280as
1100-1200 vl	Papua New Guinea, NBC	4890do				1130-1200 as	UK, BBC World Service	15310as	17785as		
1100-1200	Singapore,R Singapore Int	6015as	6150as			1130-1200 f	Vatican State, Vatican R	15595va	17550va		
1100-1130 vl	Solomon Islands, SIBC	5020do				1130-1145	Vatican State, Vatican R	5880eu	9645eu	11740eu	15595eu

SELECTED PROGRAMS

1130 Czech Rep, Radio Prague: News. See S 0000.
1130 Israel, Kol Israel: News. See S 0500.
1130 Netherlands, Radio: News. See S 0030.
1130 USA, WWCR #1 Nashville TN: A Call to Worship. Bernie Timmerman.
1130 USA, WWCR #3 Nashville TN: Holy Ghost Revival. Clayton Reynolds.
1134 Czech Rep, Radio Prague: The Week in Politics. A wrap-up of the previous week's political affairs.
1138 Netherlands, Radio: Sincerely Yours. Eighteen minutes of listener feedback via regular and electronic mail and RN's telephone answerline.
1141 Czech Rep, Radio Prague: From the Weeklies. Items and editorial opinion from the weekend Czech papers.
1145 USA, WWCR #3 Nashville TN: Ask WWCR. A mailbag program that answers listener questions about the business of showtune and radio propagation.
1148 Czech Rep, Radio Prague: Media Check. News items and editorial comment from foreign press, television, and radio.
1153 Netherlands, Radio: Sounds Interesting. Robert Chesel and his team of roving reporters explore every nook and cranny of life in Holland.

1100 USA, WWCR #1 Nashville TN: The Overcomer Broadcast (live). Brother R. G. Stain
preaches about the last days.

1100 USA, WWCR #3 Nashville TN: The Overcomer Broadcast (live). See Nam 1100

1104 Czech Rep, Radio Prague: Current Affairs. People and events in the Czech Republic
and editorial commentaries.

1116 Czech Rep, Radio Prague: Spotlight. Peter Smith focuses on a snippet of life in the
Czech Republic.

1130 Czech Rep, Radio Prague: News. See S 0000.

1130 Israel, Kol Israel: News. See S 0500.

1130 Netherlands, Radio: News. See S 0030.

1138 Netherlands, Radio: Newswire. Correspondent reports, interviews, and
commentaries on current events.

1153 Netherlands, Radio: Research File. Anne Blair Gould produces and presents this
interesting program of science and technology that is now in its tenth year.

1100 USA, WWCR #1 Nashville TN: The Overcomer Broadcast (live). See NAm 1100.
1100 USA, WWCR #3 Nashville TN: The Overcomer Broadcast (live). See NAm 1100.
1130 Czech Rep, Radio Prague: News. See S 0000.

1130 Israel, Kol Israel: News. See S 0500.
1130 Netherlands, Radio: News. See S 0030.
1134 Czech Rep, Radio Prague: Current Affairs. See M 1104.
1138 Netherlands, Radio: Newslite. See M 1138.
1141 Czech Rep, Radio Prague: Talking Point. Discussion of a topic of concern to the Czech people.
1153 Czech Rep, Radio Prague: Media Check. See S 1148.
1153 Netherlands, Radio: Music 52-15. Martha Hawley hosts this program of rarely heard

1100 USA, WWCR #1 Nashville TN: Call to Decision. Butch Fulcher.
1101 USA, WWCR #3 Nashville TN: The Overboard Broadcast (live). See Nam 1100.
1102 Czech Rep, Radio Prague: Current Affairs. See M 1104.
1107 Czech Rep, Radio Prague: History/Czech. See S 1247.
1110 Czech Rep, Radio Prague: News. See S 0000.
1130 Israel, Kol Israel: News. See S 0500.
1130 Netherlands, Radio: News. See S 0030.
1130 UK, BBC London (AS): Living with Money. See W 1530.
1130 Netherlands, Radio: Newswire. See M 1100.
1153 Netherlands, Radio: Documentary: An in-depth treatment of one subject or a short series.

1100 USA, WWCW #1 Nashville TN: Call to Decision. See NAM 1100.
1101 USA, WWCW #3 Nashville TN: The Overcomer Broadcast (live). See NAM 1100.
1130 Czech Rep, Radio Prague: News. See S 0000.
1131 Israel, Kol Israel: News. See S 0500.
1130 Netherlands, Radio: News. See S 0030.
1136 Czech Rep, Radio Prague: Current Affairs. See M 1104.
1138 Netherlands, Radio: Newslines. See M 1138.
1142 Czech Rep, Radio Prague: Press Review. News items and editorial comment from the Czech newspapers.
1144 Czech Rep, Radio Prague: Economic Report. Czech business news, government initiatives, and sound bytes on financial markets.
1149 Czech Rep, Radio Prague: I'd Like You to Meet. A studio interview with an interesting Czech personality.
1153 Netherlands, Radio: Media Network. Jonathan Marks and Diana Janssen look at the world of broadcasting. Top-rated.

1100 USA, WWCW #1 Nashville TN: The Overcomer Broadcast (live). See NAm 1100
1100 USA, WWCW #3 Nashville TN: The Overcomer Broadcast (live). See NAm 1100
1106 Czech Rep, Radio Prague: Current Affairs. See M 1104.
1109 Czech Rep, Radio Prague: Press Review. See H 1142.
1112 Czech Rep, Radio Prague: Between You and Us. Information about the Czech
Republic, commentary on listener letters, and occasional DX news.
1130 Czech Rep, Radio Prague: News. See S 0000.
1130 Israel, Kol Israel: News. See S 0500.
1130 Netherlands: Radio: News. See S 0030.
1130 UK, BBC London (AS): Understanding Cancer. See F 1530.
1138 Netherlands: Radio: Newline. See M 1138.
1153 Netherlands: Radio: A Good Life. See T 1253.

1100	USA, WYCR #3 Nashville TN: News from Ireland. A relay of Irish news from RTE Radio 1 in Dublin.
1130	Czech Rep, Radio Prague: News: See S 0000.
1130	Israel, Kol Israel: News: See S 0500.
1130	Netherlands, Radio: News: See S 0030.
1130	UK, BBC London (AS): My Century. NEW! The weekend (30-minute) version of the program described in T 0055.
1130	USA, WYCR #3 Nashville TN: The Way of Truth. A radio outreach of the Church of God (Universal) Inc. of Hagerstown, Pennsylvania.
1134	Czech Rep, Radio Prague: Current Affairs: See M 1104.
1137	Netherlands, Radio: Europe Unziped: See S 0038.
1140	Czech Rep, Radio Prague: Between You and Us: See F 1112.
1153	Netherlands, Radio: Roughly Speaking. Max Oltenschlaeger and Reza Karlosen cohost an upbeat monozing program for European youth.



1300-1400	Anguilla,Caribbean Beacon	11775am				1300-1400	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
1300-1400 vl	Australia, ABC/Alice Spgs	2310do				1300-1330	Switzerland, Swiss R Intl	9535eu			
1300-1400 vl	Australia, ABC/Katherine	2485do				1300-1400 as	Tanzania, Radio	5050af			
1300-1400 vl	Australia, ABC/Tent Creek	2325do				1300-1400	Uganda, Radio	4976do			
1300-1400	Australia, Radio	6020pa	6080as	9580pa		1300-1400	UK, BBC World Service	5965na	5990as	6190af	6195va
1300-1400 vl	Botswana, Radio	4820do	4830do	7255do			9410eu	9515na	9590na	9740as	11760me
1300-1320	Brazil, R Nacional Bras	15445am					11940af	12095eu	15220am	15310as	15420af
1300-1400 vl	Canada, CBC N Quebec Svc	9625do					15565eu	15575as	17640eu	17705eu	17830af
1300-1400	Canada, CFRX Toronto	6070do					17885af	21660af			
1300-1400	Canada, CFVP Calgary	6030do				1300-1400	UK, Merlin Network One	9915eu	13645eu	17630eu	21550af
1300-1400	Canada, CHNX Halifax	6130do				1300-1400	USA, KAU Dallas TX	5810va			
1300-1400	Canada, CKZN St John's	6160do				1300-1400	USA, KNLS Anchor Point AK	7365as			
1300-1400	Canada, CKZU Vancouver	6160do				1300-1400	USA, KTNB Salt Lk City UT	7510am			
1300-1330	Canada, R Canada Intl	9640am	13650am	17715am		1300-1400	USA, KWHR Naalehu HI	9930as	11565pa		
1300-1400 vl	Cent Afr Rep, R Minurca	9500af	9900af			1300-1400	USA, Voice of America	6160as	9645as	9760as	11705as
1300-1400 vl	Chile, R Voz Cristiana	9635am	17680am	21500am	21550am			11715as	15425as		
1300-1356	China, China Radio Intl	7385pa	9945pa	11660as	11675pa	1300-1400	USA, WEWN Birmingham AL	11875na	15745eu		
		11715pa	11980as	15180as		1300-1400 mtwhfa	USA, WGTG McCaysville GA	9400am			
1300-1400	Costa Rica,RF Peace Intl	6975am	21460am			1300-1400	USA, WHRI Noblesville IN	6040am	15105am		
1300-1400	Ecuador, HCJB	12005am	15115am	21455va		1300-1400	USA, WJCR Upton KY	7490na	13595as		
1300-1330	Egypt, Radio Cairo	17595as				1300-1400	USA, WRMI/R Miami Intl	9955am			
1300-1400 as/vl	Eqt Guinea, R East Africa	15186af				1300-1400	USA, WRNO New Orleans LA	7395am			
1300-1400	Germany, Sunrise Radio	6110va				1300-1400	USA, WSHB Cypress Crk SC	9430na	9455am		
1300-1330 s	Germany, Universal Life	15190as				1300-1400	USA, WWCR Nashville TN	5070na	5935na	7435na	15685na
1300-1400 a	Germany,Good News World R	15190as				1300-1400	USA, WYFR Oksechobee FL	5950na	11550as	11830na	11970na
1300-1400	Germany,Overcomer Ministr	5965eu						13695na			
1300-1400 vl	Ghana, Ghana BC Corp	4915do	6130do			1300-1400	Zambia, Christian Voice	6065af			
1300-1400	Guyana, GBC/Voice of	3290do	5950do			1300-1400	Zambia, Natl BC Corp	6165do	6265do		
1300-1400	Ireland, Unt Christian BC	6200do				1300-1400 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
1300-1400	Jordan, Radio	11690eu				1305-1310	Croatia, Croatian Radio	6165eu	7185eu	9830eu	
1300-1400	Kenya, Kenya BC Corp	4935do				1315-1400 mtwhfa	Bhutan, Bhutan BC Service	5030do			
1300-1400 vl	Lesotho, Radio	4800do				1325-1400	Germany, Voice of Hope	15715as			
1300-1310	Liberia,LCN/R Liberia Int	5100do				1330-1400	Austria, R Austria Intl	6155eu	13730na		
1300-1400	Malaysia, Radio	7295do				1330-1359	Canada, R Canada Intl	6150as	9535as	9640na	13650na
1300-1400 vl	Malaysia,RTM KotaKinabalu	5980do						17715na			
1300-1400 twhfas	N Mariana Is, KHBI Saipan	9355as	9385pa			1330-1400	Finland, YLE/R Finland	15400na	17660na		
1300-1400 vl	Namibia, NBC	6060af	6175af			1330-1400	Guam, AWR/KSDA	11660as			
1300-1325	Netherlands, Radio	6045eu	9855eu			1330-1400	India, All India Radio	9545as	11620as	13710as	
1300-1400 occsna	New Zealand, R NZ Intl	6105pa				1330-1400	Serbia, Radio Yugoslavia	11835au			
1300-1400 vl	Nigeria, Radio/Ibadan	6050do				1330-1400	Sweden, Radio	9425as	13740as	15240as	
1300-1400 vl	Nigeria, Radio/Kaduna	4770do				1330-1400	Turkey, Voice of	15295as	17815as		
1300-1400	Palau, KHBN/Voice of Hope	9965as	9985as	13840as		1330-1400	UAE, Radio Dubai	13630eu	13675eu	15395eu	21605eu
1300-1400 vl	Papua New Guinea, NBC	4890do				1330-1400	Uzbekistan, R Tashkent	5060as	5975as	6025as	9715as
1300-1355	Poland, Polish R Warsaw	6095eu	7270eu	9525eu	11820eu			11905as	15295as	17775as	
1300-1400	Romania, R Romania Intl	15335eu	17745na	17805eu		1330-1355	Vietnam, Voice of	5940eu	7270eu	7400eu	9839eu
1300-1400 as	S Africa, Channel Africa	11900af	17895af	21530af				12019eu	15009eu		
1300-1400	Singapore,R Singapore Int	6015as	6150as			1345-1400	Vatican State, Vatican R	13765au	15500au		

SELECTED PROGRAMS

1300 China, China Radio Intl.: News. A ten-minute summary of world news.
1300 USA, WWCR #1 Nashville TN: Voice of Hope. Oliver Fenisson.
1300 USA, WWCR #3: The Paul and Moley Show [live]. See Nam 1200.
1311 China, China Radio Intl.: News about China. Ten minutes of home news.
1313 China, China Radio Intl.: Sports Beat. News from the world of sports.
1320 China, China Radio Intl.: China Snapshots: A tour around cities and town in China with focus on local flavor and customs.
1325 China, China Radio Intl.: Report on Developing Countries. A report on projects in the Third World.
1330 Austria, R Austria Intl.: The Week in Review. A look at current events in Austria during the preceding week.
1330 USA, WWCR #1 Nashville TN: Words of Hope. See Nam 1200.
1335 China Radio Intl.: Song of the Week. New pop music in China.
1345 China, China Radio Intl.: Voices from Other Lands. A cultural program about the world and its people.
1345 USA, WWCR #1 Nashville TN: Totally Devoted. Charles Johnson preaches from Memphis, Tennessee.

1300 China, China Radio Intl.: News. See S 1300.
1300 USA, WWCR #1 Nashville TN: New Harvest International. Dennis Deruz.
1311 China, China Radio Intl.: News about China. See S 1311.
1315 USA, WWCR #1 Nashville TN: Cross Talk. Lenny Meyer.
1320 China Radio Intl.: Current Affairs. Events and happenings in China.
1325 China Radio Intl.: Press Clippings. Items from the Chinese press.
1330 Austria, R Austria Intl.: News from Vienna. See S 0030.
1330 China, China Radio Intl.: China's Open Windows. Focus on a particular area of investment in China.
1330 USA, WWCR #1 Nashville TN: Victory Baptist Church (2/4). David Robinson preaches from Hildebrand, NC.
1333 Austria, R Austria Intl.: Report from Austria. See S 0033.
1334 China, China Radio Intl.: Chongzhou Reports. The industrial city in East China's Jiangsu Province and the people who live and work there.
1345 China, China Radio Intl.: Idioms and Their Stories. A regular feature for students studying Chinese.
1345 USA, WWCR #1 Nashville TN: Walking Through the Land of Promises. Bobbie Lively evangelizes from Tennessee.

1300 China, China Radio Intl: News. See S 1300.
1300 USA. WWCR #3: The Overcomer Broadcast (live). See NAM 1100.

1311 China, China Radio Intl: News about China. See S 1511.
1315 USA, WWCW #1 Nashville TN: One Nation Under God. TJ Rodriguez.
1320 China, China Radio Intl: Current Affairs. See S 1320.
1330 Austria, R Austria Intl: News from Vienna. See S 0030.
1333 Austria, R Austria Intl: Report from Austria. See S 0033.
1334 China, China Radio Intl: Press Clippings. See M 1325.
1339 China, China Radio Intl: Orient Arena. Focus on sporting events and Chinese sports personalities.
1345 China, China Radio Intl: Voices from Other Lands. See S 1345.

1300 China, China Radio Intl.: News. See S 1300.
1301 USA, WWCR #1 Nashville TN: Faith and Truth. Ken Meggilion.
1302 USA, WWCR #3 Nashville TN: The Overcomer Broadcast (live). See NAm 1100.
1303 China, China Radio Intl.: News about China. See S 1311.
1304 USA, WWCR #1 Nashville TN: Faith Revival Ministries. Randolph Scott.
1305 China, China Radio Intl.: Current Affairs. See M 1320.
1306 Austria, R Austria Intl.: News from Vienna. See S 0030.
1307 USA, WWCR #1 Nashville TN: The Chapel Hour. Otis Tillman evangelizes from Buffalo, New York.
1308 Austria, R Austria Intl.: Report from Austria. See S 0033.
1309 China, China Radio Intl.: Press Clippings. See M 1325.
1310 China, China Radio Intl.: Profile. The activities of an interesting individual are examined.
1311 China, China Radio Intl.: Learn to Speak Chinese. Chinese language lessons for English speakers.

1300 China, China Radio Intl.: News. See S 1300.
1300 USA, WWCR #1 Nashville TN: Abounding Grace. Gary Jones of the Charismatic Teaching Center near Orlando, Florida.
1300 USA, WWCR #3: The Overcomer Broadcast (live). See NAM 1100.
1311 China, China Radio Intl.: News about China. See S 1311.
1315 China, China Radio Intl.: News Analysis. Background on current news events.
1315 USA, WWCR #1 Nashville TN: Living Waters. Spencer Tiernan evangelizes from Minnesota.
1320 China, China Radio Intl.: Current Affairs. See M 1320.
1330 Austria, R Austria Intl.: News from Vienna. See S 0030.
1330 USA, WWCR #1: The Great American Pollak Show. See NAM 0600.
1333 Austria, R Austria Intl.: Report from Austria. See S 0033.
1334 China, China Radio Intl.: Press Clippings. See M 1325.
1338 China, China Radio Intl.: Focus. Looking at an issue of significance to China's development.

China, China Radio Intl: Colorful Spectrum. The rich colorful heritage of China in literature, music and art.

1300 China, China Radio Intl.: News. See S 1300.
1300 USA, WWCW #1 Nashville TN: Faith for Today. See Nam 1230.
1300 USA, WWCW #3 Nashville TN: The Overcomer Broadcast (live). See Nam 1100.
1311 China, China Radio Intl.: News about China. See S 1311.
1320 China, China Radio Intl.: Current Affairs. See M 1320.
1330 Austria, R Austria Intl.: News from Vienna. See S 0030.
1330 USA, WWCW #1 Nashville TN: Battle Cry Sounding, Deborah Green evangelizes from El Paso, Texas.
1333 Austria, R Austria Intl.: Report from Austria. See S 0033.
1333 China, China Radio Intl.: Press Clippings. See M 1325.
1337 China, China Radio Intl.: Life in China. Focus on everyday living.
1344 China, China Radio Intl.: Global Review of developing nations.

1300	China, China Radio Intl: News. See S 1300.
1300	USA, WWCW #1 Nashville TN: Communications World ABC (from 1245). See Nam 0630.
1300	USA, WWCW #3 Nashville TN: World of Radio. Glenn Hauser's communications program for shortwave radio listeners.
1311	China, China Radio Intl: News about China. See S 1311.
1320	China, China Radio Intl: Chinese Folktales. The traditions, moral values, etiquette and customs of this ancient country and stories about real and legendary figures of China.
1325	China, China Radio Intl: The Cooking Show. Chinese recipes and cooking tips direct from Beijing.
1330	Austria, R Austria Intl: News from Vienna. See S 0030.
1330	China, China Radio Intl: China Scrapbook. Snippets of facts about China's past and present.
1330	USA, WWCW #1 Nashville TN: Battle Cry Sounding. See Nam 1330.
1330	USA, WWCW #3 Nashville TN: The Old Record Show. See Nam 0530.
1333	Austria, R Austria Intl: Report from Austria. See S 0033.
1335	China, China Radio Intl: Music from China. Chinese music from traditional to pop to annual music festivals.

1400-1500	Anguilla,Caribbean Beacon	11775am				1400-1455 as	S Africa, Channel Africa	11900af	17895af	21530af	
1400-1500 vl	Australia, ABC/Alice Spgs	2310do				1400-1500	Singapore, RTE Radio	15360as			
1400-1500 vl	Australia, ABC/Katherine	2485do				1400-1500	Singapore,RCorp Singapore	6150do			
1400-1500 vl	Australia, ABC/Tent Creek	2325do				1400-1500	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
1400-1500	Australia, Radio	5995pa	6020pa	6080as	9580pa	1400-1500	Switzerland, Swiss R Intl	9575as	15185as		
1400-1500 vl	Botswana, Radio	4820do	4830do	7255do		1400-1500 as	Tanzania, Radio	5050af			
1400-1500 vl	Canada, CBC N Quebec Svc	9625do				1400-1430	Thailand, Radio	9530as	9655as	11905as	
1400-1500	Canada, CFRX Toronto	6070do				1400-1430	Turkey, Voice of	15295as	17815as		
1400-1500	Canada, CFVP Calgary	6030do				1400-1500	Uganda, Radio	4976do			
1400-1500	Canada, CHNX Halifax	6130do				1400-1500	UK, BBC World Service	5990as	6190af	6195as	9410eu
1400-1500	Canada, CKZN St John's	6160do						9515na	9590na	9740as	11750as
1400-1500	Canada, CKZU Vancouver	6160do						11940af	12095eu	15220na	15310as
1400-1459 mthwhfs	Canada, R Canada Intl	9640am	13650am	17715am				15485eu	15565eu	15575as	17640eu
1400-1500 vl	Cent Afr Rep, R Minurca	9500af						17705eu	17830af	17840am	21470af
1400-1456	China, China Radio Intl	7405na	9535as	9700as	11675as			21660af			
		11825as	13685af	15125af		1400-1500	UK, Merlin Network One	9915eu	13680eu	17630eu	21550af
1400-1500	Costa Rica,RF Peace Intl	6975am				1400-1500	USA, KAU Dallas TX	13815va			
1400-1430	Czech Rep, R Prague Intl	21745va				1400-1500	USA, KJES Mesquite NM	11715na			
1400-1500	Ecuador, HCJB	12005am	15115am	21455va		1400-1500	USA, KTNB Salt Lk City UT	7510am			
1400-1500 as/vl	Eqt Guinea, R East Africa	15186af				1400-1500	USA, KWHR Naalehu HI	9930as	11565pa		
1400-1457	France, Radio France Intl	11910as	12030as	17560af		1400-1500	USA, Voice of America	6110as	7125as	7215as	9645as
1400-1500	Germany, RTE Radio	15625eu						9760as	11705as	15205me	15395as
1400-1500	Germany, Sunrise Radio	6110va						15425as			
1400-1500	Germany, Voice of Hope	15715as				1400-1500	USA, WEWN Birmingham AL	11875na	15745eu		
1400-1500	Germany,Overcomer Ministr	5965eu	13810me			1400-1500 mthwhfa	USA, WGTG McCaysville GA	9400am			
1400-1500 vl	Ghana, Ghana BC Corp	4915do	6130do			1400-1500	USA, WHRI Noblesville IN	6040am	15105am		
1400-1500	Guyana, GBC/Voice of	3290do	5950do			1400-1500	USA, WJCR Upton KY	7490na	13595as		
1400-1500	India, All India Radio	9545as	11620as	13710as		1400-1415	USA, WRMI/R Miami Intl	9955am			
1400-1500	Ireland, Unt Christian BC	6200do				1400-1500	USA, WRNO New Orleans LA	7395am			
1400-1500	Japan, Radio/NHK	9505na	11730as	11880af		1400-1500	USA, WWCR Nashville TN	9475na	12160na	13845na	15685na
1400-1500	Jordan, Radio	11690eu				1400-1500	USA, WYFR Okeechobee FL	5950na	11550as	11830na	17760na
1400-1500	Kenya, Kenya BC Corp	4935do				1400-1500	Zambia, Christian Voice	6065af			
1400-1500 vl	Lesotho, Radio	4800do				1400-1500	Zambia, Natl BC Corp	6165do	6265do		
1400-1500	Malaysia, Radio	7295do				1400-1500 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
1400-1500	Malaysia, RTM Sarawak	7160do				1410-1420	Greece, Voice of	7450eu	9425na		
1400-1500 vl	Malaysia,RTM KotaKinabalu	5980do				1415-1420	Nepal, Radio	3230as	5005as		
1400-1500	N Mariana Is, KHBI Saipan	9355as				1415-1500 as	USA, WRMI/R Miami Intl	9955am			
1400-1500 vl	Namibia, NBC	6060af	6175af			1430-1500	Australia, Radio	9500as	11660as		
1400-1500 occsnal	New Zealand, R NZ Intl	6105pa				1430-1459	Canada, R Canada Intl	9555va	11915va	15325va	
1400-1500 vl	Nigeria, Radio/Ibadan	6050do				1430-1500	Guam, AWR/KSDA	11980as	13720as		
1400-1500 vl	Nigeria, Radio/Kaduna	4770do				1430-1500	Myanmar, Radio	5986do			
1400-1410	Pakistan, Radio	15530eu	17835eu			1430-1500	Netherlands, Radio	12070as	12090as	15585as	
1400-1500	Palau, KHBN/Voice of Hope	9955as	9965as	9985as		1430-1500	S Africa, RTE Radio	21745af			
1400-1500 vl	Papua New Guinea, NBC	4890do				1430-1500	Sweden, Radio	13740na	15240na	17870na	21810na
1400-1500	Philippines, FEBC/R Intl	11995as				1430-1500 as	UK, BBC World Service	5990as	6195as	9740as	

1400 Czech Rep, Radio Prague: News. See S 0000.
1400 USA, WWCW #3 Nashville TN: Answers for Life. Gospel music and a sermon by Pastor Hoover of Wichita, Kansas.
1405 Czech Rep, Radio Prague: Letter from Prague. A recollection of an experience about Prague and the Czech people.
1410 Czech Rep, Radio Prague: The Arts. See S 0304.
1430 Netherlands, Radio: News. See S 0030.
1436 Netherlands, Radio: Sincerely Yours. See S 1138.
1455 Netherlands, Radio: Sounds Interesting. See S 1153.

1400	Czech Rep. Radio Prague: News. See S 0000.
1400	USA, WWCN #1 Nashville TN: The Big Backyard. Thirty minutes of rock music from Australia.
1404	Czech Rep. Radio Prague: Current Affairs. See M 1104.
1416	Czech Rep. Radio Prague: Spotlight. See M 1116.
1430	Netherlands, Radio: News. See S 0030.
1438	Netherlands, Radio: Newsline. See M 1138.
1453	Netherlands, Radio: Research File. See M 1153.
1459	USA, WWCN #1 Nashville TN: The Nice Jewish Boy Jonathan Cahn.

1400 Czech Rep, Radio Prague: News. See S 0000.
1405 Czech Rep, Radio Prague: Current Affairs. See M 1104.
1417 Czech Rep, Radio Prague: Talking Point. See T 1141.
1425 Czech Rep, Radio Prague: Music. Popular music or jazz fills out the remainder of the program.
1430 Netherlands, Radio: News. See S 0030.
1430 UK, BBC London (AF/AS): Women Who Dared to Speak. See S 0530.
1438 Netherlands, Radio: Newsline. See M 1138.
1454 Netherlands, Radio: Music 52-15. See T 1153.
1459 USA, WJCR #1 Nashville TN: The Nice Jewish Boy. See NAM 1459.

1400 Czech Rep, Radio Prague: News. See S 0000

1400	USA, WWCR #1 Nashville TN: We Believe. Jim Walsh focuses on bringing Christians back together.	1430	Netherlands, Radio: News. See S 0030.
1405	Czech Rep, Radio Prague: Current Affairs. See M 1104.	1438	Netherlands, Radio: Europe Unzipped. See S 0038.
1417	Czech Rep, Radio Prague: HistoryCzech. See S 1247.	1455	Netherlands, Radio: Weekend. See S 0054.
1425	Czech Rep, Radio Prague: Music. See T 1425.		
1430	Netherlands, Radio: News. See S 0030.		
1438	Netherlands, Radio: Newslines. See M 1138.		
1453	Netherlands, Radio: Documentary. See W 1153.		
1459	USA, WWCR #1 Nashville TN: The Nice Jewish Boy. See NAm 1459.		

1400 Czech Rep, Radio Prague: News. See S 0000.
1400 USA, WWC# 1 Nashville TN: Afterglow. Don Johnson plays beautiful sacred music.
1406 Czech Rep, Radio Prague: Current Affairs. See M 1104.
1416 Czech Rep, Radio Prague: Economic Report. See H 1144.
1425 Czech Rep, Radio Prague: Music. See T 1425.
1430 Netherlands, Radio: News. See S 0030.
1438 Netherlands, Radio: Newsline. See M 1138.
1454 Netherlands, Radio: Media Network. See H 1153.
1459 USA, WWC# 1 Nashville TN: The Nice Jewish Boy. See NAM 1459.

1400 Czech Rep, Radio Prague: News. See S 0000.
1406 Czech Rep, Radio Prague: Current Affairs. See M 1104.
1418 Czech Rep, Radio Prague: Postbag. See F 0018.
1425 Czech Rep, Radio Prague: Music. See T 1425.
1430 Netherlands, Radio: News. See S 0030.
1438 Netherlands, Radio: Newsline. See M 1138.
1455 Netherlands, Radio: A Good Life. See T 1253.
1459 USA, WWCN #1 Nashville TN: The Nice Jewish Boy. See NAM 1459.

1400 Czech Rep, Radio Prague: News. See S 0000.
1400 USA, WWCN #3 Nashville TN: Lyon Gold and Silver Magnet Program (repeat). See NAM 0530.
1404 Czech Rep, Radio Prague: Encore. Recordings of classical music by Czech artists.

S Africa, Channel Africa	11900af	17895af	21530af	
Singapore, RTE Radio	15360as			
Singapore,RCorp Singapore	6150do			
Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
Switzerland, Swiss R Intl	9575as	15185as		
Tanzania, Radio	5050af			
Thailand, Radio	9530as	9655as	11905as	
Turkey, Voice of	15295as	17815as		
Uganda, Radio	4976do			
UK, BBC World Service	5990as	6190af	6195as	9410eu
	9515na	9590na	9740as	11750as
	11940af	12095eu	15220na	15310as
	15485eu	15565eu	15575as	17640eu
	17705eu	17830af	17840am	21470af
	21660af			
UK, Merlin Network One	9915eu	13680eu	17630eu	21550af
USA, KAUJ Dallas TX	13815va			
USA, KJES Mesquite NM	11715na			
USA, KTVN Salt Lk City UT	7510am			
USA, KWHR Naalehu HI	9930as	11565pa		
USA, Voice of America	6110as	7125as	7215as	9645as
	9760as	11705as	15205me	15395as
	15425as			
USA, WEWN Birmingham AL	11875na	15745eu		
USA, WGTG Mcaysville GA	9400am			
USA, WHRI Noblesville IN	6040am	15105am		
USA, WJCR Upton KY	7490na	13595as		
USA, WRMI/R Miami Intl	9955am			
USA, WRNO New Orleans LA	7395am			
USA, WWCN Nashville TN	9475na	12160na	13845na	15685na
USA, WYFR Okeechobee FL	5950na	11550as	11830na	17760na
Zambia, Christian Voice	6065af			
Zambia, Natl BC Corp	6165do	6265do		
Zimbabwe, Zimbabwe BC	4828do	5012do		
Greece, Voice of	7450eu	9425na		
Nepal, Radio	3230as	5005as		
USA, WRMI/R Miami Intl	9955am			
Australia, Radio	9500as	11660as		
Canada, R Canada Intl	9555va	11915va	15325va	
Guam, AWR/KSDA	11980as	13720as		
Myanmar, Radio	5986do			
Netherlands, Radio	12070as	12090as	15585as	
S Africa, RTE Radio	21745af			
Sweden, Radio	13740na	15240na	17870na	21810na
UK, BBC World Service	5990as	6195as	9740as	

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1500-1600	Anguilla,Caribbean Beacon	11775am				1500-1600	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	
1500-1600 vl	Australia, ABC/Alice Spgs	2310do				1500-1600 vl	Papua New Guinea, NBC	4890do			
1500-1600 vl	Australia, ABC/Katherine	2485do				1500-1600	Philippines, FEBC/R Intl	11995as			
1500-1600 vl	Australia, ABC/Tent Creek	2325do				1500-1600	Russia,Voice of Russia WS	6030eu	7440eu	9775as	9800as
1500-1600	Australia, Radio	5995pa	9500as	9580pa	11660as			11500as			
1500-1600 vl	Botswana, Radio	4820do	4830do	7255do		1500-1530	S Africa, Channel Africa	17870af			
1500-1600 vl	Canada, CBC N Quebec Svc	9625do				1500-1600	Seychelles, FEBA Radio	11600as			
1500-1600	Canada, CFRX Toronto	6070do				1500-1600	Singapore, RTE Radio	15360as	15625as		
1500-1600	Canada, CFYP Calgary	6030do				1500-1600	Singapore,RCorp Singapore	6150do			
1500-1600	Canada, CHNX Halifax	6130do				1500-1600	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
1500-1600	Canada, CKZN St John's	6160do				1500-1600 as	Tanzania, Radio	5050af			
1500-1600	Canada, CKZU Vancouver	6160do				1500-1600	Uganda, Radio	4976do			
1500-1600 s	Canada, R Canada Intl	9640am	13650am	17715am		1500-1600	UK, BBC World Service	6190af	9410af	9515na	9590na
1500-1600 vl	Cent Afr Rep, R Minurca	9500af	9900af					11860af	11940af	12095eu	15220na
1500-1600	China, China Radio Intl	7160as	7405na	9785as	13685af			15400af	15420af	15485eu	15565eu
		15125af						17705eu	17830af	17840am	21470af
								21490af	21660af		
1500-1600	Costa Rica,RF Peace Intl	6975am	21460am			1500-1600 mtwhf	UK, BBC World Service	5975as			
1500-1600	Ecuador, HCJB	12005am	15115am	21455va		1500-1600 as	UK, BBC World Service	5990as	11750as	15310as	
1500-1600 as/vl	Eqt Guinea, R East Africa	15186af						5995as	6195as	9740as	
1500-1600	Germany, Sunrise Radio	6110va				1500-1600	UK, Merlin Network One	9915eu	13680eu	17630eu	21550af
1500-1530	Germany, Voice of Hope	15715as				1500-1600	USA, KAU Dallas TX	13815na			
1500-1600	Germany,Overcomer Ministr	6010eu	13810me			1500-1600	USA, KJES Mesquite NM	11715na			
1500-1600 vl	Ghana, Ghana BC Corp	4915do	6130do			1500-1600	USA, KTVN Salt Lk City UT	7510am			
1500-1600	Guam, TWR/KTWR	12015as				1500-1600	USA, KWHR Naalehu HI	9930as			
1500-1600	Guyana, GBC/Voice of	3290do	5950do			1500-1600	USA, Voice of America	6110as	7125as	7215as	9575me
1500-1600	Ireland, Unt Christian BC	6200do						9645as	9760as	9845as	12040as
1500-1530	Israel, Kol Israel	15650va	17535va					15205me	15395as		
1500-1600	Japan, Radio/NHK	7200as	9505na	9750as	11730as	1500-1600	USA, WEWN Birmingham AL	11875na	15745eu		
1500-1600	Jordan, Radio	11690eu				1500-1600 mtwhfa	USA, WGTG McCaysville GA	9400am			
1500-1600	Kenya, Kenya BC Corp	4935do				1500-1600	USA, WHRI Noblesville IN	13760am	15105am		
1500-1600 vl	Lesotho, Radio	4800do				1500-1600	USA, WJCR Upton KY	7490na	13595as		
1500-1510	Liberia,LCN/R Liberia Int	5100do				1500-1600 s	USA, WRMI/R Miami Intl	9955ca			
1500-1600	Malaysia, Radio	7295do				1500-1600	USA, WRNO New Orleans LA	7395am			
1500-1600	Malaysia, RTM Sarawak	7160do				1500-1600	USA, WWCR Nashville TN	9475na	12160na	13845na	15685na
1500-1600 vl	Malaysia,RTM KotaKinabalu	5980do				1500-1600	USA, WYFR Okeechobee FL	11830na	17760na		
1500-1530	Mexico, Radio Mexico Intl	9705na				1500-1600	Zambia, Christian Voice	6065af			
1500-1530	Mongolia, Voice of	11790as	12085as			1500-1600	Zambia, Natl BC Corp	6165do	6265do		
1500-1600	Myanmar, Radio	5986do				1500-1600 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
1500-1600 vl	Namibia, NBC	6060af	6175af			1530-1540	Bangladesh, Bangla Betar	4880as	15520as		
1500-1600	Netherlands, Radio	12070as	12090as	15585as		1530-1600	Guam, AWR/KSDA	11625as	11925as		
1500-1600 occsna	New Zealand, R NZ Intl	6105pa				1530-1545	India, All India Radio	4775as	4850as	9700as	11740as
1500-1600 vl	Nigeria, Radio/Ibadan	6050do				1530-1600	Iran, VOIRI	7250as	11775as	13605as	
1500-1600 vl	Nigeria, Radio/Kaduna	4770do				1530-1600	Tanzania, Radio	5050af			
1500-1600 vl	Nigeria, Voice of	7255af	15120va			1545-1600 sh	Bangladesh, Bangla Betar	4880as	15520as		
1500-1600	North Korea, R Pyongyang	3560as	9640va	9975me	11335am	1550-1600 a	Vatican State, Vatican R	11640as	13765as		
		11735am	13650va								

SELECTED PROGRAMS

1500 Israel, Kol Israel: News. See S 0500.
1500 Radio Mexico Intl: Mirror of Mexico. Focus on manufacturing and industry in Mexico.
1525 Netherlands, Radio: Four Minutes. A short commentary.
1527 Israel, Kol Israel: Top Stories. News headlines at the end of the broadcast.
1530 Netherlands, Radio: News. See S 0030.
1530 USA, WWCR #1 Nashville TN: A Temple of Jesus Christ. Cleveland Waters preaches from Philadelphia.
1539 Netherlands, Radio: Wide Angle. See S 1238.
1554 Netherlands, Radio: Aural Tapestry. See S 1254.

1500 Israel, Kol Israel: News. See S 0500.
1500 Radio Mexico Intl: Antenna Radio Summary: A 15-minute magazine of news, finance, and culture.
1500 USA, WWCW #1 Nashville TN: The Nice Jewish Boy. See NAM 1459.
1502 USA, WWCW #1 Nashville TN: The Grace Hour [live]. Carl Stevens of Baltimore answers listener questions about religion.
1523 Israel, Kol Israel: Business News. Israel in the international marketplace.
1525 Netherlands, Radio: Press Review. See S 1225.
1530 Netherlands, Radio: News. See S 0030.
1538 Netherlands, Radio: Newslines. See M 1138.
1555 Netherlands, Radio: EuroQuest. See M 1253.

1500 Israel, Kol Israel: News. See S 0500.
1500 Radio Mexico Intl: Antenna Radio Summary. See M 1500.
1525 Netherlands, Radio: Press Review. See S 1225.
1528 Israel, Kol Israel: Top Stories. See S 1527.
1530 Netherlands, Radio: News. See S 0030.
1538 Netherlands, Radio: Newline. See M 1138.
1554 Netherlands, Radio: A Good Life. See T 1253.

1500 Israel, Kol Israel: News. See S 0500.
1500 Radio Mexico Intl: Antenna Radio Summary. See M 1500.
1500 USA, WWCR #1 Nashville TN: The Nice Jewish Boy. See NAM 1459.
1502 USA, WWCR #1 Nashville TN: The Grace Hour (live). See NAM 1502.

1525 Israel, Kol Israel: Science Watch. Developments in science and technology in Israel.
1525 Netherlands, Radio: Press Review. See S 1225.
1530 Netherlands, Radio: News. See S 0030.
1530 UK, BBC London (AF): Living with Money. A new series as part of the Learning Zone for
English students who want to learn more about science.
1538 Netherlands, Radio: Newline. See M 1138.
1553 Netherlands, Radio: Sounds Interesting. See S 1153.

1500 Israel, *Kol Israel: News*. See S 0500.
1500 Radio Mexico Intl: *Antenna Radio Summary*. See M 1500.
1500 USA, *WWCR #1 Nashville TN: The Nice Jewish Boy*. See Nam 1459.
1502 USA, *WWCR #1 Nashville TN: The Grace Hour (live)*. See Nam 1502.
1525 Netherlands, *Radio: Press Review*. See S 1225.
1530 Netherlands, *Radio: News*. See S 0030.
1538 Netherlands, *Radio: Newslime*. See M 1138.
1553 Netherlands, *Radio: Research File*. See M 1153.

1500 Israel, Kol Israel: News. See S 0500.
1500 Radio Mexico Intl: Antenna Radio Summary. See M 1500.
1500 USA, WWCW #1 Nashville TN: The Nice Jewish Boy. See Nam 1459.
1502 USA, WWCW #1 Nashville TN: The Grace Hour (live). See Nam 1502.
1513 Israel, Kol Israel: Current Cultural Events in Israel. News from the world of the arts.
1525 Netherlands, Radio: Press Review. See S 1225.
1528 Israel, Kol Israel: Top Stories. See S 1527.
1530 Netherlands, Radio: News. See S 0030.
1530 UK, BBC London (AE): Understanding Cancer. A new 10-part series which aims to equip listeners with the knowledge and understanding needed to manage this life-threatening condition.
1538 Netherlands, Radio: Newsline. See M 1138.
1553 Netherlands, Radio: Documentary. See W 1153.

1500 Israel, Kol Israel: News. See S 0500.
1500 Radio Mexico Intl: The Sounds of Mexico. See S 1600.
1500 USA, WWCR #1 Nashville TN: The Infalible Truth. John Standifer.
1500 USA, WWCR #3 Nashville TN: USA Radio News. See NAM 1200.
1505 USA, WWCR #3 Nashville TN: Travel Smart (live). Jaqueline Woller.

1510 Israel, Kol Israel: The Week in Review. A summary and update of the week's most
important news.
1525 Netherlands, Radio: Insight. See S 0025.
1530 Netherlands, Radio: News. See S 0030.
1530 USA, WWCR #1 Nashville TN: Sunrise. Larry Reichardt evangelizes.
1538 Netherlands, Radio: Newsline. See M 1138.
1554 Netherlands, Radio: Roughly Speaking. See A 1153.

SWBC Schedules - Broadcast frequencies and programs, updated weekly+	\$35/year
Smart Lowe Control 32 - NEW - Smart control for the Lowe HF-150	\$60/wms
Smart R8 Control - Smart control for the Drake R8/R8A/R8B	\$25 pos/\$40 wms/\$60 wms
Smart Audio Control - Audio scope and spectrum analyzer for your PC	\$25 wms/\$35 wms
SWBC Interval Signals - Turn your PC into a virtual shortwave receiver	\$5 pos/\$30 wms

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FREQUENCIES

1600-1700	Algeria, R Algiers Intl	6160af	11715af	15160me	1600-1700 sm	Russia, Voice of Russia WS	6005me		
1600-1700	Anguilla, Caribbean Beacon	11775am			1600-1630	S Africa, Channel Africa	6000af		
1600-1700 vl	Australia, ABC/Alice Spgs	2310do			1600-1610	Saudi Arabia, BSKSA	15170af		
1600-1700 vl	Australia, ABC/Katherine	2485do			1600-1700	South Korea, R Korea Intl	5975as	9515va	9870as
1600-1700 vl	Australia, ABC/Tent Creek	2325do			1600-1700	Swaziland, Trans World R	9500af		
1600-1700	Australia, Radio	5995pa	9500as	9580pa	1600-1615	Switzerland, Swiss R Intl	9575as	15185as	
1600-1700 vl	Botswana, Radio	4820do	4830do	7255do	1600-1700	Tanzania, Radio	5050af		
1600-1700 vl	Canada, CBC N Quebec Svc	9625do			1600-1645	UAE, Radio Dubai	13630eu	13675eu	15395eu
1600-1700	Canada, CFRX Toronto	6070do			1600-1700	Uganda, Radio	4976do		
1600-1700	Canada, CFVP Calgary	6030do			1600-1700	UK, BBC World Service	3915as	5975as	5990as
1600-1700	Canada, CHNX Halifax	6130do					6195va	7160as	9410eu
1600-1700	Canada, CKZN St John's	6160do					9740as	11750as	11940af
1600-1700	Canada, CKZU Vancouver	6160do					15310as	15400af	15485eu
1600-1659 s	Canada, R Canada Intl	9640am	13650am	17715am			17830af	17840am	21470af
1600-1700 vl	Cent Afr Rep, R Minurca	5900af			1600-1700	UK, Merlin Network One	6185eu	21550af	21600af
1600-1656	China, China Radio Intl	7190af	9565af		1600-1700	USA, KAU Dallas TX	13815a		
1600-1700	Costa Rica, RF Peace Intl	6975am	21460am		1600-1700	USA, KTBN Salt Lk City UT	15590am		
1600-1700	Ethiopia, Radio	7165af			1600-1700	USA, KWHR Naalehu HI	9930as		
1600-1654	France, Radio France Intl	11615af	11700af	11995af	1600-1700	USA, Voice of America	6035af	6110as	7125as
		15210af	15530af	12015af			9575me	9645as	7215as
1600-1650	Germany, Deutsche Welle	6170as	7120af	7225as			12040af	13600af	13710af
		9735af	11810af	13790as			15225af	15395as	15410af
		17800af					17895af		
1600-1700	Germany, Sunrise Radio	6110va			1600-1700	USA, WEWN Birmingham AL	11875na	13615na	15745eu
1600-1630 s	Germany, Universal Life	11840af			1600-1700 mtwhfa	USA, WGTG McCaysville GA	9400am		
1600-1700 a	Germany, Good News World R	11840va			1600-1700	USA, WHRI Noblesville IN	13760am	15105am	
1600-1700	Germany, Overcomer Ministr	6010eu	13810me		1600-1700	USA, WJCR Upton KY	7490na	13595as	
1600-1700 vl	Ghana, Ghana BC Corp	4915do	6130do		1600-1700 s	USA, WRMI/R Miami Intl	9955ca		
1600-1700	Guam, AWR/KSDA	11980as			1600-1700	USA, WRNO New Orleans LA	15420am		
1600-1630	Guam, TWR/KTWR	12015as			1600-1700	USA, WSHB Cypress Crk SC	18910af		
1600-1700	Guyana, GBC/Voice of	3290do	5950do		1600-1700	USA, WWCR Nashville TN	9475na	12160na	13845na
1600-1630	Iran, VOIRI	7250as	11775as	13605as	1600-1700	USA, WYFR Okeechobee FL	11830na	15215na	15695eu
1600-1700	Ireland, Unt Christian BC	6200do					17760ca	21525af	
1600-1700	Jordan, Radio	11690eu			1600-1610 a	Vatican State, Vatican R	11640as	13765as	
1600-1700	Kenya, Kenya BC Corp	4935do			1600-1625	Vietnam, Voice of	5940eu	7270eu	7400eu
1600-1700	Lebanon, Voice of Hope	9960me					15009eu		
1600-1700 vl	Lesotho, Radio	4800do			1600-1700	Zambia, Christian Voice	3330af	4965af	
1600-1700	Malaysia, Radio	7295do			1600-1700	Zambia, Natl BC Corp	6165do	6265do	
1600-1630 smtwha	Mexico, Radio Mexico Intl	9705na			1600-1630 vl	Zimbabwe, Zimbabwe BC	4828do	5012do	
1600-1700 vl	Namibia, NBC	6060af	6175af		1615-1700 as	UK, BBC World Service	9515na	11860af	
1600-1625	Netherlands, Radio	12070as	12090as	15585as	1630-1700	Canada, R Canada Intl	6140as	7150as	
1600-1650 occsna	New Zealand, R NZ Intl	6105pa			1630-1700	Canada, R Canada Intl	6140as	7150as	
1600-1700 vl	Nigeria, Radio/Ibadan	6050do			1630-1700 s	Canada, R Canada Intl	9640na	13650na	17715na
1600-1700 vl	Nigeria, Radio/Kaduna	4770do			1630-1700	Egypt, Radio Cairo	15255af		
1600-1700 vl	Nigeria, Voice of	7255af	15120va		1630-1700 mtwhf	Eqt Guinea, Radio Africa	7190af	15186af	
1600-1630	Pakistan, Radio	11570me	15170af	15325eu	1630-1700 s	Seychelles, FEBA Radio	11665as		
		17720af		15465eu	1630-1700 vl	Zimbabwe, Zimbabwe BC	3306do	4828do	
1600-1700	Palau, KHBN/Voice of Hope	9955as	9965as		1645-1700	Israel, Kol Israel	9435va	11605va	15650va
1600-1700 vl	Papua New Guinea, NBC	4890do			1645-1700	Tajikistan, Radio	7245as		
1600-1700	Russia, Voice of Russia WS	4730me	4940me	4975me	1650-1700 mtwhf	New Zealand, R NZ Intl	11675pa		
		9775me		7210me					

SELECTED PROGRAMS

Sundays

1600	China, China Radio Intl: News. See S 1300.	1620	China, China Radio Intl: Current Affairs. See M 1320.
1600	Radio Mexico Intl: Eternally Mexico. New program - no information available.	1634	China, China Radio Intl: Press Clippings. See M 1325.
1611	China, China Radio Intl: News about China. See S 1311.	1639	China, China Radio Intl: Orient Arena. See T 1339.
1613	China, China Radio Intl: Sports Beat. See S 1313.	1645	China, China Radio Intl: Voices from Other Lands. See S 1345.
1620	China, China Radio Intl: China Snapshots. See S 1320.	1645	Israel, Kol Israel: News. See S 0500.
1625	China, China Radio Intl: Report on Developing Countries. See S 1325.	1645	USA, WWCR #1 Nashville TN: The Sower. See NAm 1645.
1630	USA, WWCR #1 Nashville TN: Cross Roads Baptist Church. Lloyd Ferguson preaches from Lawrenceville, Georgia.		
1635	China, China Radio Intl: Song of the Week. See S 1335.		
1645	China, China Radio Intl: Voices from Other Lands. See S 1345.		
1645	Israel, Kol Israel: News. See S 0500.		

Mondays

1600	China, China Radio Intl: News. See S 1300.	1611	China, China Radio Intl: News about China. See S 1311.
1600	Radio Mexico Intl: Universal Forum. See S 0400.	1620	China, China Radio Intl: Current Affairs. See M 1320.
1611	China, China Radio Intl: News about China. See S 1311.	1625	China, China Radio Intl: Press Clippings. See M 1325.
1620	China, China Radio Intl: Current Affairs. See M 1320.	1630	China, China Radio Intl: China's Open Windows. See M 1330.
1625	China, China Radio Intl: Press Clippings. See M 1325.	1634	China, China Radio Intl: Changzhou Reports. See M 1334.
1630	China, China Radio Intl: China's Open Windows. See M 1330.	1645	China, China Radio Intl: Idioms and Their Stories. See M 1345.
1634	China, China Radio Intl: Changzhou Reports. See M 1334.	1645	Israel, Kol Israel: News. See S 0500.
1645	China, China Radio Intl: Idioms and Their Stories. See M 1345.	1645	USA, WWCR #1 Nashville TN: The Sower. Musical treat and spiritual tonic with Michael Guido.
1645	Israel, Kol Israel: News. See S 0500.		

Tuesdays

1600	China, China Radio Intl: News. See S 1300.
1600	Radio Mexico Intl: Eternally Mexico. See S 1600.
1611	China, China Radio Intl: News about China. See S 1311.

Wednesdays

1600	China, China Radio Intl: News. See S 1300.	1611	China, China Radio Intl: News about China. See S 1311.
1600	Radio Mexico Intl: Mail Box. A typical mailbox program in which letters from English-speaking listeners are discussed on the air.	1620	China, China Radio Intl: Current Affairs. See M 1320.
1611	China, China Radio Intl: News about China. See S 1311.	1634	China, China Radio Intl: Press Clippings. See M 1325.
1620	China, China Radio Intl: Current Affairs. See M 1320.	1638	China, China Radio Intl: Profile. See W 1338.
1634	China, China Radio Intl: Press Clippings. See M 1325.	1645	China, China Radio Intl: Learn to Speak Chinese. See W 1345.
1638	China, China Radio Intl: Profile. See W 1338.	1645	Israel, Kol Israel: News. See S 0500.
1645	China, China Radio Intl: Learn to Speak Chinese. See W 1345.	1645	USA, WWCR #1 Nashville TN: The Sower. See NAm 1645.
1645	Israel, Kol Israel: News. See S 0500.		

Thursdays

1600	China, China Radio Intl: News. See S 1300.	1611	China, China Radio Intl: News about China. See S 1311.
1611	China, China Radio Intl: News about China. See S 1311.	1615	China, China Radio Intl: Current Affairs. See M 1320.
1615	China, China Radio Intl: News Analysis. See H 1315.	1620	China, China Radio Intl: Press Clippings. See M 1325.
1620	China, China Radio Intl: Current Affairs. See M 1320.	1638	China, China Radio Intl: Focus. See H 1338.
1634	China, China Radio Intl: Press Clippings. See M 1325.	1644	China, China Radio Intl: Cultural Spectrum. See H 1344.
1638	China, China Radio Intl: Focus. See H 1338.	1645	Israel, Kol Israel: News. See S 0500.
1644	China, China Radio Intl: Cultural Spectrum. See H 1344.	1645	USA, WWCR #1 Nashville TN: The Sower. See NAm 1645.
1645	Israel, Kol Israel: News. See S 0500.		

Fridays

1600	China, China Radio Intl: News. See S 1300.
1600	Radio Mexico Intl: Universal Forum. See S 0400.
1611	China, China Radio Intl: News about China. See S 1311.
1620	China, China Radio Intl: Current Affairs. See M 1320.
1633	China, China Radio Intl: Press Clippings. See M 1325.
1637	China, China Radio Intl: Life in China. See F 1337.
1644	China, China Radio Intl: Global Review. See F 1344.
1645	Israel, Kol Israel: News. See S 0500.
1645	USA, WWCR #1 Nashville TN: The Sower. See NAm 1645.

Saturdays

1600	China, China Radio Intl: News. See S 1300.
1600	Radio Mexico Intl: Mail Box. See W 1600.
1600	USA, WWCR #1 Nashville TN: Let the Bible Speak. James Hickey with a program from New Testament Christianity in Oklahoma.
1600	USA, WWCR #3 Nashville TN: The Free American (live). Clay Douglas hosts the program that promotes America for Americans.
1611	China, China Radio Intl: News about China. See S 1311.
1615	USA, WWCR #1 Nashville TN: Eternal Good News. Germaine Lockwood of the Congregation of Messiah in Oklahoma teaches from the Old Testament.
1620	China, China Radio Intl: Chinese Folktales. See A 1320.
1625	China, China Radio Intl: The Cooking Show. See A 1325.
1630	China, China Radio Intl: China Scrapbook. See A 1330.
1630	USA, WWCR #1 Nashville TN: The Showers of Blessings Broadcast. Ed McAbee sermonizes before a live congregation.
1635	China, China Radio Intl: Music from China. See A 1335.
1645	Israel, Kol Israel: News. See S 0500.
1645	USA, WWCR #1 Nashville TN: Words of Hope. See NAm 1200.

1800 UTC

1800-1900	Anguilla, Caribbean Beacon	11775am
1800-1900 mtwhf	Argentina. RAE	15345eu

FREQUENCIES

[illegible]

2000 UTC

2000-2100	Algeria, R Algiers Intl	11715af	11750af		
2000-2100	Anguilla, Caribbean Beacon	11775am			
2000-2100 vl	Australia, ABC/Alice Spgs	2310do	ABC/Katherine	2485do	2000-2100 vl
Australia, ABC/Tent Creek	2325do				
2000-2100	Australia, Radio	9500as 12080as	9580pa	9660as	11880pa
2000-2100 vl	Botswana, Radio	4820do	4830do		
2000-2100	Bulgaria, Radio	5850eu	7535eu		
2000-2100	Canada, CFRX Toronto	6070do	CFVP Calgary	6030do	

2000-2100	Canada, CHNX Halifax	6130do	CKZN St John's	6160do	
2000-2100	Canada, CKZU Vancouver	6160do			
2000-2100 vl	Cent Afr Rep, R Minurua	5900af			
2000-2100 vl	Chile, R Voz Cristiana	6070am	17680am	21500am	21550am
2000-2056	China, China Radio Intl	5220eu 9920eu	6950eu 11840af	7170af 11975saf	9440af 15500af
2000-2100	Costa Rica,RF Peace Intl	15050am			
2000-2100	Ecuador, H/CJB	15115eu	21460am		
2000-2100 mthwhf	Egt Guinea, Radio Africa	7190af	15186af		
2000-2030	Finland, YLE/R Finland	6135eu			
2000-2050	Germany, Deutsche Welle	7285eu			
2000-2100	Germany,Overcomer Ministr	11925me			
2000-2100 vl	Ghana, Ghana BC Corp	3366do	4915do		
2000-2100	Guatemala, Adv World R	5980am			
2000-2100	Guyana, GBC/Voice of	3290do	5950do		
2000-2030	Hungary, Radio Budapest	3975eu	6025eu		
2000-2100	Indonesia, Voice of	9525as	11765as	15510as	
2000-2030	Iran, VOIRI	7215eu	7260eu	9022eu	
2000-2100	Ireland, Unt Christian BC	6200do			
2000-2025	Israel, Kol Israel	7465eu	9435eu	11605va	15640am
2000-2100 vl	Italy, IRRS	3985va			
2000-2020	Italy, RAI Intl	5970eu	7120eu		
2000-2100	Kenya, Kenya BC Corp	4885do	4935do		
2000-2100	Kuwait, Radio	11990am			
2000-2100	Lebanon, Voice of Hope	9960me			
2000-2100 vl	Lesotho, Radio	4800do			
2000-2100	Liberia, Radio Veritas	5470do			
2000-2055	Liberia,LCN/R Liberia Int	5100do			
2000-2100	Malaysia, Radio	7295do			
2000-2100	Malta, VO Mediterranean	7440eu			
2000-2030	Mexico, Radio Mexico Intl	9705na			
2000-2100	N Mariano Is, KHBI Saipan	13840pa			
2000-2100 vl	Namibia, NBC	3270af	3289af		
2000-2025	Netherlands, Radio	6020af	9605af	9895af	11655af
		15315af			
2000-2100	New Zealand, R NZ Intl	17675pa			
2000-2015 vl	Niger, Voice du Sahel	5019do			
2000-2100 vl	Nigeria, Radio/Ibadan	6050do			
2000-2100 vl	Nigeria, Radio/Kaduna	4770do			
2000-2100	Nigeria, Radio/Lagos	3326do			
2000-2100	Nigeria, Voice of	7255af	15120va		
2000-2100 vl	Papua New Guinea, NBC	9675do			
2000-2100	Russia,Voice of Russia WS	5940eu	5965eu	7340eu	9480eu
		9890eu			
2000-2005	S Africa, Voice of Hope	6290af			
2000-2100 vl	Solomon Islands, SIBC	5020do			
2000-2100 mthwhf	Spain, R Exterior Espana	9595af	9680eu		
2000-2015	Swaziland, Trans World R	3200af			
2000-2030	Switzerland, Swiss R Intl	6165eu	9620af	9885af	11910af
		13700af			
2000-2030	Turkey, Voice of	9630as	9655va		
2000-2100	Uganda, Radio	4976do			
2000-2100	UK, BBC World Service	3255af 6180eu 9740pa	3955eu 6195eu 12095sa	5975pa 7325eu 15400af	6005af 9410eu 17830af
		11835af			9630af
2000-2100	UK, Merlin Network One	11985eu			
2000-2100	USA, KAU Dallas TX	13815na			
2000-2100	USA, KTVN Salt Lk City UT	15590am			
2000-2100	USA, KWHR Nadehu HI	15405as			
2000-2100	USA, Voice of America	6035af	6095me	7415af	9760me
		11875af	11975af	13710af	15410af
		15580af	17725af	17755af	
2000-2100	USA, WBQC Monticello ME	7415na			
2000-2100	USA, WEWN Birmingham AL	9385eu	11875na	13615na	
2000-2100 mthwhf	USA, WGTG McCaysville GA	9400am			
2000-2100	USA, WHRA Greenbush ME	15460af			
2000-2100	USA, WHRI Nobilesville IN	9495am	13760am		
2000-2100	USA, WINB Red Lion PA	13790am			
2000-2100	USA, WJCR Upton KY	7490na	13595as		
2000-2100 smthwhf	USA, WMLK Bethel PA	9465va			
2000-2100 a	USA, WRMI/R Miami Intl	9955ca			
2000-2100	USA, WRNO New Orleans LA	15420am			
2000-2100	USA, WSHB Cypress Crk SC	9355eu	11550eu	13770af	15665af
2000-2100	USA, WWCN Nashville TN	9475na	12160na	13845na	15685na
2000-2045	USA, WYFR Okeechobee FL	2125af			
2000-2100	USA, WYFR Okeechobee FL	5810eu	7355eu	15565af	
2000-2100 vl	Vanuatu, Radio	4960do			
2000-2030	Vatican State, Vatican R	9660af	11625af	13765af	
2000-2100	Zambia, Christian Voice	3330af	4965af		
2000-2100	Zambia, Natl BC Corp	6165do	6265do		
2000-2100 vl	Zimbabwe, Zimbabwe BC	3306do	4828do		
2005-2010	Syria, Radio Damascus	12085eu	13605eu		
2015-2030	Albania, R Tirana Intl	7180eu	9650eu		
2015-2010 vl	Libya, Voice of Africa	15235va	15415va	15435va	
2025-2045	Italy, RAI Intl	7175af	9670af	11715af	
2030-2100 th	Belarus, R Belarus Intl	7105eu	7210eu		
2030-2100	Cuba, Radio Havana	13720eu	13750eu		
2030-2100	Egypt, Radio Cairo	15375af			
2030-2100	Georgia, Georgian Radio	11760eu			
2030-2100	Germany, AWR Europe	9640af			
2030-2055	Moldova, R Moldova Intl	7520eu			
2030-2100	Mongolia, Voice of	11790eu	12085eu		
2030-2100	Poland, Polish R Warsaw	6035eu	6095eu	7285eu	9525eu
2030-2100	S Africa, AWR Africa	9745af			
2030-2100	Sweden, Radio	6065va	13830va		
2030-2045	Thailand, Radio	9535eu	9655eu	11905eu	
2030-2100 as	USA, Voice of America	4950af			
2030-2100	Uzbekistan, R Tashkent	7105eu	9540eu		
2030-2055	Vietnam, Voice of	5940eu	7270eu	7400eu	9839eu
		12019eu	15009eu		
2045-2100	India, All India Radio	7410eu	9650eu	9910au	9950eu
		11620va	11715au		
2050-2100	Vatican State, Vatican R	4005eu	5880eu	7250eu	9645eu

2100-2200	Anguilla,Caribbean Beacon	11775am				2130-2200 th	Belarus, R Belarus Intl	7105eu	7210eu		
2100-2130 vl	Australia, ABC/Alice Spgs	2310do				2130-2200	Guam, AWR/KSDA	15610as			
2100-2130 vl	Australia, ABC/Katherine	2485do				2130-2200	Iran, VOIRI	6165au	9725as		
2100-2200 vl	Australia, ABC/Katherine	5025do				2130-2135 mtwhf	Latvia, Radio Latvia Intl	5935eu			
2100-2130 vl	Australia, ABC/Tent Creek	2325do				2130-2155	Moldova, R Moldova Intl	7520eu			
2100-2200	Australia, Radio	7240as	9500pa	9660pa	11880pa	2130-2200	Turkey, Voice of	9525va			
		12080as	17715pa	21740pa		2130-2145 tf	UK, BBC Calling Falklands	11680sa			
		3356do	4820do			2200 UTC					
2100-2200 vl	Botswana, Radio	9625do				2200-2300	Anguilla,Caribbean Beacon	6090am			
2100-2200 vl	Canada, CBC N Quebec Svc	6070do				2200-2300 vl	Australia, ABC/Katherine	5025do			
2100-2200	Canada, CFRX Toronto	6070do				2200-2300 vl	Australia, ABC/Tent Creek	4910do			
2100-2200	Canada, CFVP Calgary	6030do				2200-2300	Australia, Radio	17715pa	17795pa	21740pa	
2100-2200	Canada, CHNX Halifax	6130do				2200-2300	Bulgaria, Radio	7535eu	7545eu		
2100-2200	Canada, CKZN St John's	6160do				2200-2300	Canada, CBC N Quebec Svc	9625do			
2100-2200	Canada, CKZU Vancouver	6160do				2200-2300	Canada, CFRX Toronto	6070do			
2100-2159	Canada, R Canada Intl	5995af	7235af	9770af	9805af	2200-2300	Canada, CFVP Calgary	6030do			
		11945af	13650af	13690af	15150aa	2200-2300	Canada, CHNX Halifax	6130do			
		17820af				2200-2300	Canada, CKZN St John's	6160do			
		5900af				2200-2300	Canada, CKZU Vancouver	6160do			
2100-2200 vl	Cent Afr Rep, R Minurca	6070am	11745am	17680am	21550am	2200-2229	Canada, R Canada Intl	5995va	7235va	9770va	9805va
2100-2200 vl	Chile, R Voz Cristiana	6950eu	7170af	9440af	9920eu			11705as	11945va	13690va	15150va
2100-2156	China, China Radio Intl	11840af	11975af	15500af				5900af			
		15050am	21460am			2200-2300 vl	Cent Afr Rep, R Minurca	7170eu			
2100-2200	Costa Rica,RF Peace Intl	13720eu	13750eu			2200-2256	China, China Radio Intl	21460am			
2100-2130	Cuba, Radio Havana	5930eu	7345va			2200-2300	Costa Rica,RF Peace Intl	15050am			
2100-2127	Czech Rep, R Prague Intl	15115eu	21455am			2200-2245	Egypt, Radio Cairo	9900eu			
2100-2200	Ecuador, HCJB	15375af				2200-2300 mtwhf	Eqt Guinea, Radio Africa	7190af	15186af		
2100-2200	Egypt, Radio Cairo	7190af	15186af			2200-2300	Germany,Overcomer Ministr	12040as			
2100-2200 mtwhf	Eqt Guinea, Radio Africa	9615af	9670as	9690af	9765as	2200-2300 vl	Ghana, Ghana BC Corp	3366do	4915do		
2100-2150	Germany, Deutsche Welle	11785af	11865af	15275af		2200-2300	Guyana, GBC/Voice of	3290do	5950do		
		12040as				2200-2230	Hungary, Radio Budapest	3975eu	7250eu		
2100-2200	Germany,Overcomer Ministr	3366do	4915do			2200-2230	India, All India Radio	7410eu	9650eu	9910au	9950eu
2100-2200 vl	Ghana, Ghana BC Corp	3290do	5950do					11620va	11715au		
2100-2200	Guyana, GBC/Voice of	7410eu	9650eu	9910au	9950eu	2200-2230	Iran, VOIRI	6165au			
2100-2200	India, All India Radio	11620va	11715au			2200-2300	Ireland, Unt Christian BC	6200do			
		11785va				2200-2300 vl	Italy, IRRS	3985va			
2100-2200 irreg	Iraq, Radio Iraq Intl	6200do				2200-2225	Italy, RAI Intl	5990as	9675as	11900as	
2100-2200	Ireland, Unt Christian BC	3985va				2200-2215	Liberia,LCN/R Liberia Intl	5100do			
2100-2200 vl	Italy, IRRS	6035pa	9725eu	11850pa	13630na	2200-2300	Malaysia, Radio	7295do			
2100-2200	Japan, Radio/NHK	4885do	4935do			2200-2225	Moldova, R Moldova Intl	7520eu			
2100-2130	Kenya, Kenya BC Corp	4800do				2200-2300 vl	Namibia, NBC	3270af	3289af		
2100-2200 vl	Lesotho, Radio	5470do				2200-2300	New Zealand, R NZ Intl	17675pa			
2100-2200	Liberia, Radio Veritas	5100do				2200-2300 vl	Nigeria, Radio/Ibadan	6050do			
2100-2115	Liberia,LCN/R Liberia Int	7295do				2200-2300 vl	Nigeria, Radio/Kaduna	4770do			
2100-2200	Malaysia, Radio	9705na				2200-2300	Nigeria, Radio/Lagos	3326do			
2100-2130 smthf	Mexico, Radio Mexico Intl	3270af	3289af			2200-2300 vl	Papua New Guinea, NBC	9675do			
2100-2200 vl	Namibia, NBC	17675pa				2200-2230	Serbia, Radio Yugoslavia	6100eu	6185eu		
2100-2200	New Zealand, R NZ Intl	6050do				2200-2300 vl	Solomon Islands, SIBC	5020do			
2100-2200 vl	Nigeria, Radio/Ibadan	4770do				2200-2300 as	Spain, R Exterior Espana	9595af	9680eu		
2100-2200 vl	Nigeria, Radio/Kaduna	3326do				2200-2205	Syria, Radio Damascus	12085eu	13605na		
2100-2200	Nigeria, Radio/Lagos	4405as	6575eu	9335eu	11710am	2200-2300	Taiwan, Radio Taipei Intl	5810eu	9985eu		
2100-2200	North Korea, R Pyongyang	13760am				2200-2230	Turkey, Voice of	9525va			
		9675do				2200-2300	UK, BBC World Service	3955eu	5965as	5975am	6175na
2100-2200 vl	Papua New Guinea, NBC	6035eu	6095eu	7285eu	9525eu			6195va	7110as	7385as	9590na
2100-2125	Poland, Polish R Warsaw	7105eu	9550eu	9690eu				9660as	9915sa	11835af	11955as
2100-2200	Romania, R Romania Intl	5940eu	5965eu	7300eu	7340eu	2200-2300	USA, Voice of America	12080pa	12095sa	15400af	
2100-2200	Russia,Voice of Russia WS	9890eu						7120eu	7170eu	9835na	
		5020do				2200-2300	UK, Merlin Network One	4820eu	5905eu	6020eu	6080eu
2100-2200 vl	Solomon Islands, SIBC	3970eu	6480eu			2200-2300	Ukraine, R Ukraine Intl	7205eu	7380eu	7420eu	9560eu
2100-2130	South Korea, R Korea Intl	15575eu						9610na			
2100-2200	South Korea, R Korea Intl	12085na	13605na			2200-2300	USA, KAU Dallas TX	13815na			
2100-2200	Syria, Radio Damascus	3255af	3915as	3955eu	5965as	2200-2300	USA, KTVN Salt Lk City UT	15590am			
2100-2200	UK, BBC World Service	5975va	6005af	6110as	6180eu	2200-2300	USA, Voice of America	7215as	9770as	9890as	11760as
		6190af	6195va	7325eu	9410eu			15185as	15290as	15305as	17735pa
		9740pa	11835af	12095sa	15400af	2200-2230 mtwhf	USA, Voice of America	17820as	6035af	7415af	12080af
2100-2200	USA, KAU Dallas TX	13815va						13710af			
2100-2200	USA, KTVN Salt Lk City UT	15590am				2200-2300	USA, WBCQ Monticello ME	7415na			
2100-2200	USA, Voice of America	6035af	6040me	6095me	7415af	2200-2300	USA, WEWN Birmingham AL	5825na	5850eu	13615na	
		11870pa	11975af	13710af	15185pa	2200-2300 mtwhfa	USA, WGTG Mcaysville GA	6890na	9400am		
		15410af	15580af	17725af	17735pa	2200-2300	USA, WHRA Greenbush ME	13760af			
2100-2200	USA, WBCQ Monticello ME	7415na				2200-2300	USA, WHRI Noblesville IN	5755am	9495am		
2100-2200	USA, WEWN Birmingham AL	9385eu	11875na	13615na		2200-2300	USA, WINB Red Lion PA	13790am			
2100-2200 mtwhfa	USA, WGTG Mcaysville GA	9400am				2200-2300	USA, WJCR Upton KY	7490na	13595as		
2100-2200	USA, WHRA Greenbush ME	15460af				2200-2300 as	USA, WRMI/R Miami Intl	9955sa			
2100-2200	USA, WHRI Noblesville IN	5755am	9495am			2200-2300	USA, WRNO New Orleans LA	15420am			
2100-2200	USA, WINB Red Lion PA	13790am				2200-2300	USA, WRNO New Orleans LA	7510eu	15285sa		
2100-2200	USA, WJCR Upton KY	7490na	13595as			2200-2300	USA, WWSH Cypress Crk SC	5070na	7435na	9475na	13845na
2100-2200 smtwhf	USA, WMLK Bethel PA	9465va				2200-2245	USA, WYFR Okeechobee FL	11580af	11740na	15565af	
2100-2200 as	USA, WRMI/R Miami Intl	9955sa				2200-2300 vl	Vanuatu, Radio	4960do			
2100-2200	USA, WRNO New Orleans LA	15420am				2200-2210	Zambia, Natl BC Corp	6165do	6265do		
2100-2200	USA, WWSH Cypress Crk SC	13770eu	15665af			2230-2300	Albania, R Tirana Intl	7160eu			
2100-2200	USA, WWCR Nashville TN	7435na	9475na	12160na	13845na	2230-2300	Austria, R Austria Intl	5945eu	6155eu	13730af	
2100-2200	USA, WYFR Okeechobee FL	7355eu	11580af	15565va		2230-2300	Belgium, R Vlaanderen Int	13670na			
2100-2200 vl	Vanuatu, Radio	4960do				2230-2300	Cuba, Radio Havana	9550am			
2100-2110	Vatican State, Vatican R	4005eu	5880eu	7250eu	9645eu	2230-2257	Czech Rep, R Prague Intl	7345na	9435na		
2100-2200	Zambia, Christian Voice	3330af	4965af			2230-2300	Sweden, Radio	6065va	7325va		
2100-2200	Zambia, Natl BC Corp	6165do	6265do			2240-2250	Greece, Voice of	7475au	9425au		
2100-2200 vl	Zimbabwe, Zimbabwe BC	3306do	4828do			2245-2300	India, All India Radio	7410as	9705as	9950as	11620as
2115-2145 mtwhfa	Armenia, Voice of	4810va	9965va			2245-2300	USA, WYFR Okeechobee FL	11740na			
2115-2200	Egypt, Radio Cairo	9900eu				2245-2300	Vatican State, Vaican R	7305au	9600au	11830au	
2115-2130 mtwhf	UK, BBC Caribbean Report	5975ca	15390ca	17715ca							
2130-2200	Australia, ABC/Tent Creek	4910do									



FREQUENCIES

2300-0000	Anguilla, Caribbean Beacon	6090am				2300-0000	Singapore, R Corp Singapore	6150do			
2300-0000 vl	Australia, ABC/Katherine	5025do				2300-0000 vl	Solomon Islands, SIBC	5020do			
2300-0000 vl	Australia, ABC/Tent Creek	4910do				2300-0000	Turkey, Voice of	7280eu	9655va		
2300-0000	Australia, Radio	9660pa	12080as	17715pa	17795pa	2300-0000	UK, BBC World Service	3955eu	5965am	5975am	6035as
		21740pa						6175na	6195va	7110as	9590na
		9625do						9915sa	11945as	11955as	12095sa
2300-0000	Canada, CBC N Quebec Svc	6070do						15280as			
2300-0000	Canada, CFRX Toronto	6030do				2300-0000	UK, Merlin Network One	3985eu	7170eu	9835na	
2300-0000	Canada, CFPV Calgary	6130do				2300-0000	USA, KAU Dallas TX	13815na			
2300-0000	Canada, CHNX Halifax	6160do				2300-0000	USA, KTBN Salt Lk City UT	15590am			
2300-0000	Canada, CKZN St John's	6160do				2300-0000	USA, Voice of America	7215as	9770as	9890as	11760as
2300-0000	Canada, CKZU Vancouver	5960am	6040am	9535am	9755am			15185as	15290as	15305as	17735pa
2300-2329	Canada, R Canada Intl	11865am						17820as			
		5900af				2300-0000	USA, WBCQ Monticello ME	7415na			
2300-0000 vl	Cent Afr Rep, R Minurca	6070am	11745am	15375am	21550am	2300-0000	USA, WEWN Birmingham AL	5825na	5850eu	13615na	
2300-0000 vl	Chile, R Voz Cristiana	15050am	21460am			2300-0000 mtwhfa	USA, WGTG McCaysville GA	5085am	6890am		
2300-2330	Costa Rica, RF Peace Intl	9550am				2300-0000	USA, WHRA Greenbush ME	13760af			
2300-2330	Cuba, Radio Havana	9900am				2300-0000	USA, WHRI Noblesville IN	5755am	9495am		
2300-2350	Egypt, Radio Cairo	5990as	6045as	6130as	7235as	2300-0000	USA, WINB Red Lion PA	13790am			
	Germany, Deutsche Welle	15360as				2300-0000	USA, WJCR Upton KY	7490na	13595as		
		9405sa				2300-0000	USA, WRMI/R Miami Intl	9955sa			
2300-0000 s	Germany, Good News World R	12040as				2300-0000	USA, WRNO New Orleans LA	7355am			
2300-0000	Germany, Overcomer Ministr	3366do	4915do			2300-0000	USA, WSHB Cypress Crk SC	7510eu	15285sa		
2300-0000 vl	Ghana, Ghana BC Corp	11775as				2300-0000	USA, WWCN Nashville TN	3215na	5070na	7435na	9475na
2300-2330 as	Guam, AWR/KSDA	3290do						13845na			
2300-0000	Guyana, GBC/Voice of	7410as	5950do	9950as	11620as	2300-2345	USA, WYFR Okeechobee FL	11740na			
2300-0000	India, All India Radio	6200do				2300-0000 vl	Vanuatu, Radio	4960do			
2300-0000	Ireland, Unt Christian BC	5100do				2315-0000 vl	Libya, Voice of Africa	15235va	15415va	15435va	
2300-2315	Liberia, LCN/R Liberia Int	7295do				2330-2359 as	Canada, R Canada Intl	6040am	9535am	11865am	
2300-0000	Malaysia, Radio	7520eu				2330-2359	Canada, R Canada Intl	5960na	9755na		
2300-2325	Moldova, R Moldova Intl	3270af	3289af			2330-0000 mtwhf	Guam, AWR/KSDA	11775as			
2300-0000 vl	Namibia, NBC	17675pa				2330-0000 vl	Guatemala, Radio Cultural	3300do			
2300-0000	New Zealand, R NZ Intl	6050do				2330-0000	Malaysia, RTM Sarawak	7160do			
2300-2330 vl	Nigeria, Radio/Ibadan	4770do				2330-0000	Netherlands, Radio	6165na	9845na		
2300-2330 vl	Nigeria, Radio/Kaduna	3326do				2330-0000	USA, KWHR Naalehu HI	17510as			
2300-2330	Nigeria, Radio/Lagos	11335am	13760am	15130am		2330-2355	Vietnam, Voice of	5940af	7270af	7400af	9839am
2300-0000	North Korea, R Pyongyang	9675do						12019am	15009af		
2300-0000 vl	Papua New Guinea, NBC	6130eu	7195eu	9570na	11830na	2340-2350	Greece, Voice of	7450sa	9400sa	9400sa	11645sa
2300-0000	Romania, R Romania Intl					2345-0000 mtwhf	UK, BBC World Service	3915as			

SELECTED PROGRAMS

Sundays

- 2300 Romania, R Romania Intl: Radio Newsreel. See S 0200.
- 2300 USA, WWCR #1 Nashville TN: A Brighter Day. Jane Rogowski evangelizes from Maryland.
- 2300 USA, WWCR #3 Nashville TN: Emergency Preparedness Y2K (live). No information available.
- 2315 USA, WWCR #1 Nashville TN: The Illuminated Word. C.M. Hunt preaches.
- 2330 Netherlands, Radio: News. See S 0030.
- 2330 Romania, R Romania Intl: Panorama (Radio Tour). Holiday opportunities, trekking, leisure, picturesque landscape, fun, hunting, fishing, cooking tips, stamp collecting, and hobby land.
- 2330 USA, WWCR #1 Nashville TN: Church of the Lord Jesus Christ. Bishop Shelton Rappa Chabash Luke is the apostle and general overseer preaching from Philadelphia.
- 2338 Netherlands, Radio: Wide Angle. See S 1238.
- 2340 Greece, Voice of: News. See S 0140.
- 2354 Netherlands, Radio: Aural Tapestry. See S 1254.

Mondays

- 2300 Romania, R Romania Intl: Radio Newsreel. See S 0200.
- 2300 USA, WWCR #3 Nashville TN: Let's Talk Health (live). Kurt Donsbach, a holistic practitioner, answers listeners' medical questions.
- 2330 Netherlands, Radio: News. See S 0030.
- 2330 Romania, R Romania Intl: Pro Memoria. History, archaeology, numismatics, treasures, museums, the trail of time and living history.
- 2338 Netherlands, Radio: Newsline. See M 1138.
- 2340 Greece, Voice of: News. See S 0140.
- 2353 Netherlands, Radio: EuroQuest. See M 1253.

Tuesdays

- 2300 Romania, R Romania Intl: Radio Newsreel. See S 0200.
- 2300 USA, WWCR #3 Nashville TN: Let's Talk Health (live). See Nam 2300.
- 2330 Netherlands, Radio: News. See S 0030.
- 2330 Romania, R Romania Intl: Business Club. Economic agenda, world trade, investments in Romania, legislation, the stock exchange, business opportunities, and market wrap.
- 2338 Netherlands, Radio: Newsline. See M 1138.
- 2340 Greece, Voice of: News. See S 0140.
- 2353 Netherlands, Radio: A Good Life. See T 1253.

Wednesdays

- 2300 Romania, R Romania Intl: Radio Newsreel. See S 0200.
- 2300 USA, WWCR #3 Nashville TN: Let's Talk Health (live). See Nam 2300.

- 2330 Netherlands, Radio: News. See S 0030.
- 2330 Romania, R Romania Intl: Society. Everyday life, grassroots people, "why me?" frame of mind, she and he, the third age, and point-counterpoint.
- 2338 Netherlands, Radio: Newsline. See M 1138.
- 2340 Greece, Voice of: News. See S 0140.
- 2353 Netherlands, Radio: Sounds Interesting. See S 1153.

Thursdays

- 2300 Romania, R Romania Intl: Radio Newsreel. See S 0200.
- 2300 USA, WWCR #3 Nashville TN: Let's Talk Health (live). See Nam 2300.
- 2330 Netherlands, Radio: News. See S 0030.
- 2330 Romania, R Romania Intl: Citizens of the Same Country. What brings us together, destiny, religion, who we are, and identities and standards.
- 2338 Netherlands, Radio: Newsline. See M 1138.
- 2340 Greece, Voice of: News. See S 0140.
- 2353 Netherlands, Radio: Research File. See M 1153.

Fridays

- 2300 Romania, R Romania Intl: Radio Newsreel. See S 0200.
- 2300 USA, WWCR #1 Nashville TN: No Such Thing As... (live). Philip Hoag.
- 2300 USA, WWCR #3 Nashville TN: Let's Talk Health (live). See Nam 2300.

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THANK YOU...

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Sounding the Ionosphere

How do you measure the heights of the various layers of the ionosphere? In December, I discussed the use of OTHR (Over the Horizon Radar) for surveillance of the oceans and airspace at long range, but these elaborate systems of high power transmitters and complex receivers are also used to check on the height of the various layers of the ionosphere.

There is also another tool that is used for this task: the ionosonde. The primary function of these instruments is to find the best frequency for communication purposes; in doing so, it will calculate the heights of the various layers. Not only will find the height of a layer, it will also display what frequencies will be refracted, absorbed or simply lost to space.

Two types of ionosonde are presently being used. The first type, normally used for research purposes, transmits a signal straight up; the co-located receiver picks up the echoes sent back from the ionospheric layers above. Presently there are probably close to one hundred of these installations around the world, principally used by universities and other research establishments.

The second type uses receivers located in the area being targetted. This second type of ionosonde not only sounds the ionosphere but, as we will see later, can be used to broadcast short messages, encrypted or in the clear. The main users of the second type are the militaries and heavy users of HF communications. In this type of installation the receivers are disseminated around the world.

The transmitter used for these sounders are generally not very powerful, 10 to 100 watts, but they possess frequency agility, i.e., as they transmit their signal, the frequency of the signal is smoothly varied in the range between 2 and 30 MHz. This frequency sweep is carefully timed and kept constant so that the receivers, whether co-located or located at the receiving end of the various paths, can lock on the sweep, hear the signal and record the heights of the ionospheric layers and the important frequencies indigenous to the particular circuit.

The most important frequency recorded by this system is the MUF (Maximum Usable Frequency) from which it is possible to statistically derive the OWF (Optimum Working Frequency) for that circuit.

Most users of the second type of ionosonde try to coordinate their transmission times so not to interfere with each other. A full sweep of the full frequency spectrum takes less than five minutes, and due to the low power of the

OPTIMUM WORKING FREQUENCIES (MHz) For the Period 15 February to 14 March 1999 Flux=172 SSN=134 Predictions prepared using ASAPS for Windows®

UTC	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
TO/FROM US WEST COAST																								
SOUTH AMERICA	30	29	26	22	20	17	16	15	15	14	13	13	12	13	21	28	30	30	31	31	32	32	32	31
WESTERN EUROPE	11	10	10	10	10	10	10	9	10	10	10	*	*	*	11	16	19	21	21	19	17	15	13	12
EASTERN EUROPE (P)	9	10	9	9	10	12	11	10	*	*	*	*	*	*	11	14	18	17	15	*	*	*	*	*
MEDITERRANEAN	16	16	16	16	15	13	12	11	*	*	*	*	*	*	13	17	20	22	24	24	21	19	18	17
MIDDLE EAST (P)	12	12	12	14	16	13	*	*	*	*	*	*	*	*	10	10	13	17	16	14	13	*	*	*
CENTRAL AFRICA	26	24	23	19	17	14	13	12	*	*	*	*	*	*	17	21	24	26	27	26	27	28	28	28
SOUTH AFRICA	18	17	15	14	12	13	14	13	13	*	*	*	*	*	22	28	30	31	30	28	26	24	21	20
SOUTH EAST ASIA (P)	26	26	25	22	19	16	*	*	*	*	10	10	10	10	10	11	15	19	21	20	18	15	*	16
FAR EAST	26	25	25	23	20	17	14	12	11	10	10	10	10	10	10	11	13	13	13	12	13	18	24	25
AUSTRALIA	29	30	30	30	27	23	20	18	17	16	15	14	14	13	11	13	19	18	17	17	21	26	27	29
TO/FROM US MIDWEST																								
SOUTH AMERICA	26	25	21	18	16	15	14	14	14	13	12	11	12	17	25	28	28	28	28	29	29	29	29	28
WESTERN EUROPE	13	12	12	11	11	11	11	11	12	12	12	12	*	15	19	22	24	24	24	23	20	18	16	14
EASTERN EUROPE	9	9	9	9	9	11	11	10	*	*	*	*	*	11	15	18	20	18	15	13	*	*	*	*
MEDITERRANEAN	17	17	16	16	14	13	13	12	12	*	*	*	*	15	20	22	24	26	26	24	21	20	18	17
MIDDLE EAST (P)	13	13	12	14	13	12	*	*	*	*	*	*	*	12	14	17	20	19	17	15	14	13	13	13
CENTRAL AFRICA	26	23	20	18	15	14	14	13	13	*	*	*	*	18	22	25	27	28	28	26	28	28	28	28
SOUTH AFRICA	18	17	15	14	12	13	14	14	14	*	*	*	*	22	27	30	31	31	30	28	26	24	21	20
SOUTH EAST ASIA (P)	24	23	21	18	15	*	*	*	*	*	10	10	10	10	11	15	18	21	20	19	17	15	13	15
FAR EAST	25	24	23	20	16	14	12	11	10	10	10	11	10	10	11	13	13	14	13	13	14	19	24	26
AUSTRALIA	29	30	30	26	22	19	17	15	15	14	14	14	13	12	14	20	18	17	16	17	21	26	27	29
TO/FROM US EAST COAST																								
SOUTH AMERICA	21	19	16	15	14	14	13	13	12	11	10	11	17	23	26	26	25	25	26	26	26	26	26	24
WESTERN EUROPE	12	11	11	11	10	10	10	10	11	11	11	12	17	21	22	23	23	22	22	21	19	16	14	13
EASTERN EUROPE	9	9	9	9	9	10	11	11	11	*	*	*	11	14	18	21	22	21	18	16	14	12	10	9
MEDITERRANEAN	17	17	16	15	14	13	13	13	13	*	*	*	13	18	22	24	26	26	26	26	24	22	20	19
MIDDLE EAST (P)	13	13	13	13	13	13	12	*	*	*	*	*	16	20	22	24	23	20	17	15	14	14	13	13
CENTRAL AFRICA	23	21	18	17	17	16	16	15	14	*	*	20	27	30	30	31	31	31	29	27	28	29	30	26
SOUTH AFRICA	18	17	15	14	12	13	16	15	14	*	*	19	26	31	32	31	31	32	30	28	26	24	22	20
SOUTH EAST ASIA (P)	20	18	15	14	*	*	*	*	*	*	11	11	12	15	18	20	22	20	19	18	17	15	13	13
FAR EAST	24	21	18	15	13	13	12	11	11	12	11	11	11	13	13	13	13	14	13	13	13	17	22	25
AUSTRALIA	29	27	23	19	17	15	14	14	14	14	14	13	13	17	20	19	18	17	16	17	21	26	27	28

* Unfavorable conditions: Search around the last listed frequency for activity.
(P) denotes circuit across polar auroral zone; reception may be poor during ionospheric disturbances.

transmitters, it is possible for two or more sounders to be operated simultaneously without interfering with each other.

I mentioned earlier that it is possible to use the ionosonde of the second type (designed and marketed by BR Communications of California) to transmit short messages. A message having a maximum of 40 characters will be automatically repeated 63 times during a sweep between 2 and 30 MHz without human intervention. The odds for the message to be properly received at the other end of the circuit(s) are extremely high; the locking-in of the re-

ceiver to the transmitted frequency being accomplished completely automatic insures that the message will be properly received and stored for later retrieval by the user-operator.

If you wish to pursue further readings on ionosonde, here are a couple of references:

"Monitoring the World's Ionosondes," Andrew W. Clegg. *Popular Communications*, September 1993

The NEW Shortwave Propagation Handbook, George Jacobs W3ASK, Theodore Cohen N4XX and Robert B. Rose K6GKU.

Learning to Fish - Part 2

In January, we discussed the fact that learning to fish was a considerable improvement over being given a fish. Wait now, you say, this is a *radio* magazine! Why are we discussing angling?

We're not. The point I'm trying to illustrate is that a certain measure of self sufficiency in any pursuit is helpful. Obtaining programming information about international shortwave broadcasts is no exception. You can rely on me or Jim Frimmel to provide you with the schedules — "give you a fish," as it were. (And we are more than happy to do it!) But, wouldn't it be better for you to be able to find some schedules on your own — in other words, "learn to fish" for yourself?

OK, no more talk about fish. In January's column we tried to help you home in on only those stations that had a history of providing, when requested, more than just time and frequency information. That way you wouldn't have to waste postage writing to stations that don't seem inclined to provide program information to any degree.

That's helpful. But now that we are in the digital age, there is another tool that, when used in conjunction with your radio, can be even more helpful in tracking down programming information. That tool is the Internet.

There are a considerable and growing number of stations that are using the Internet for a range of purposes, including as a means to display their programming schedules. Yes, connecting to the Internet does require a computer or Web TV device and the payment of at least one monthly fee. But if you're already there, then the programming information you seek is, too — and at no additional cost!

■ Macro Sites

For years, Bob Colyard has assembled a personally selected listing of DX and listener letter programs, as well as other programs Bob finds ... well ... "interesting." Hence, *The DX and Other Interesting Programs Page* which Bob updates regularly on his site *Bob Colyard's DX Pages*. Point your browser to <<http://www.cybercomm.net/cgi-bin/cgiwrap/~slapshot/speedx.sh>>.

Yours truly also maintains a free Internet service that was designed by Pete Costello and is housed on a site provided by the shortwave club, NASWA (the North American Shortwave Association) and its webmaster, Ralph Brandi. The WWW Shortwave Listening Guide provides you with the current hour's program

offerings and permits you to pull down a list of the day's programs by categories of content. The address is <<http://www.anarc.org/naswa/swlguide>>. This site is also regularly updated.

But, in a sense, these "all in one" Internet sites still rely on someone else to gather the information for you. The truly intrepid want to go straight to the horse's mouth — in a manner of speaking, of course.

■ Station Links

Several stations maintain Internet sites with some level of programming information. As with printed schedules, some stations do better than others. But the Internet is a much more unpredictable and dynamic medium. Stations regularly redesign their sites, adding new features and dropping others. New stations are coming online all the time.

What follows is a list of stations and sites that I have found to be quite reliable over time (see accompanying chart). But it pays to search for new sites and survey old ones for promising changes. In addition, an e-mail to the site's webmaster might prompt the station to start providing the programming information you are looking for.

There are three helpful Internet sites that provide updated lists and links to stations having their own Internet sites. Pete Costello (Where have I heard that name before?) maintains a multifaceted site called the *Shortwave Radio/Catalog* that includes, among lots of other radio-related information, a comprehensive list of station links. The location is <<http://itre.ncsu.edu/radio/>> and that specific listing of shortwave stations online is on the "Shortwave" page.

For some years, Thorsten Koch has studiously maintained an excellent directory of shortwave radio station links, which now resides at the Internet site of the Nordic Shortwave Center. *The Internet Guide to International Broadcasters* may be accessed at <<http://www.nordicdx.com/iguide/>>.

Some longtime SWLs might recall the name Bernd Friedewald and his publication, *The International Listening Guide*, from some years ago. Bernd has moved from printed page to printed screen and his ILG is now available over the Internet. As with Pete and Thorsten, he also provides a free listing with links to the world's shortwave broadcasters. *ILGRadio's International Broadcasting Web Directory* can be found at <<http://www.ilg.de/ilg-www.htm>>.

When using any of these Internet sites, be aware that their authors and proprietors provide them free of charge as a service to their fellow hobbyists — a fine example of the spirit of international friendship those in this hobby seek to promote.

Happy hunting...or good fishing ... or whatever ... Until March, good listening!

STATION INTERNET SITES WITH PROGRAMMING INFORMATION

The following sites are especially worth noting. To find the Internet address of these stations, use one of the three sites highlighted in the "Station Links" above. In all cases, they provide the names of specific programs and the times at which they are broadcast. Some may provide a short, general description of some or all programs. A + indicates the site has at least some advance program information for specific episodes or installments of programs. A # indicates that the station will e-mail you advance program information regularly upon request.

BBC +
CFRX
DW #
HCJB #
R. Australia
R. Austria International +
Polish R. Warsaw
RCI + (# for CBC programming relayed by RCI)
R. for Peace International + #
R. France Internationale (incomplete)
R. Habana Cuba (incomplete)
R. Japan
R. Korea International (sometimes outdated)
R. New Zealand International
R. Netherlands +
R. Prague
R. Vlaanderen Internationaal
Swiss R. International
Voice of America (incomplete; + pertains only to *Talk to America* program)
Voice of Russia
Trans World Radio Swaziland
WBCQ +
WEWN +
WGTG +
WHRI
WSHB
WWCR (+ by using supplied links to many program sites).

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Catalog No. 62-1335



SATELLITE RADIO GUIDE



INTERNATIONAL SHORTWAVE BROADCASTERS (via satellite)

By Larry Van Horn, MT Assistant Editor

WRN One English to North America

Galaxy 5, 125 degrees West, transponder 6 (TBS) 3.820 GHz, V-Pol, audio subcarrier 6.80 MHz. WRN programme details can be heard at 0625, 1525 and 1955 Eastern. Program information is also available on TBS Text page 204. You can reach WRN by email at online@wrn.org or through their website on the internet at <http://www.wrn.org>. Many programs can also be heard in Canada on *CBC English Overnight*. WRN is relayed 24 hours a day on many cable systems via the CSPAN Audio One Network. All times are U.S. Eastern Time and all programs in English.

Time	Station
0000	Radio Telefis Eireann (RTE) — Dublin, Ireland (Irish Collection)
0100	Swiss Radio International — Berne, Switzerland
0130	Monday-Friday: Radio Vlaanderen International — Brussels, Belgium (Brussels Calling) Saturday: United Nations Radio — New York, NY USA Sunday: Glenn Hauser's <i>World of Radio</i>
0200	Polish Radio — Warsaw, Poland
0230	Radio Canada International — Montreal, Canada
0300	Radio Australia — Melbourne, Australia
0400	Voice of Russia — Moscow, Russia
0500	Radio Prague — Prague, Czech Republic
0530	Radio Netherlands — Hilversum, Netherlands
0630	YLE Radio Finland — Helsinki, Finland
0700	Radio Australia — Melbourne, Australia
0800	Radio Telefis Eireann (RTE) — Dublin, Ireland
0900	Radio Prague — Prague, Czech Republic
0930	Monday-Saturday: Channel Africa — Auckland Park, South Africa Sunday: United Nations Radio — New York, NY USA
1000	Monday-Saturday: YLE Radio Finland — Helsinki, Finland Sunday: Voice of America <i>Communications World</i> — Washington, DC USA
1030	Radio Vlaanderen International — Brussels, Belgium (Brussels Calling)
1100	Radio France International — Paris, France
1200	Monday-Friday: <i>Caribbean Tempo</i> from CANA Radio Saturday: Glenn Hauser's <i>World of Radio</i> Sunday: <i>Norden This Week and Health Watch</i>
1215	Monday-Friday: Vatican Radio — Vatican City (World News)
1230	Radio Austria International — Vienna, Austria
1300	Monday-Friday: British Broadcasting Corporation — London, England (Europe Today) Saturday: Radio New Zealand International, Wellington Sunday: Radio Denmark — Copenhagen, Denmark (Copenhagen Calling)
1330	Radio Telefis Eireann (RTE) — Dublin, Ireland
1400	Radio Vlaanderen International — Brussels, Belgium (Brussels Calling)
1430	Radio Netherlands — Hilversum, Netherlands
1530	Radio Sweden — Stockholm, Sweden
1600	Swiss Radio International — Berne, Switzerland
1630	Polish Radio — Warsaw, Poland
1700	Radio Telefis Eireann (RTE) — Dublin, Ireland
1900	Radio Netherlands — Hilversum, Netherlands
2000	Radio Australia — Melbourne, Australia
2030	Monday-Friday: Radio Slovakia International — Bratislava, Slovakia Saturday: Network Africa — Johannesburg, South Africa Sunday: Radio Denmark — Copenhagen, Denmark (Copenhagen Calling)
2100	YLE Radio Finland — Helsinki, Finland
2130	Radio Sweden — Stockholm, Sweden
2200	Radio Prague — Prague, Czech Republic
2230	Radio Austria International — Vienna, Austria
2300	Polish Radio — Warsaw, Poland
2330	Radio Budapest — Budapest, Hungary

WRN Two Multi-Lingual to North America

Galaxy 5, 125 degrees West, transponder 6 (TBS) 3.820 GHz, V-Polarization, Audio subcarrier 6.2 MHz. Note that some programs listed below are subject to pre-emption without notice. All times are U.S. Eastern Time.

Time	Station
0000	World Radio Network from National Public Radio
0600	YLE Radio Finland — Helsinki, Finland (News in Finnish). On Saturdays a phone-in for children in Finnish until 0630.
0610	YLE Radio Finland — Helsinki, Finland (Easy listening music with announcements in Finnish and English)
0630	YLE Radio Finland — Helsinki, Finland (News of the past 24 hours in Finnish)
0700	Interval signal
0800	Raidio na Gaeltachta (News in Irish)
0900	Radio Prague — Prague, Czech Republic (Programming in Czech)
0927	Interval signal
1000	YLE Radio Finland — Helsinki, Finland (Regional broadcasts from various parts of Finland in Finnish)
1030	YLE Radio Finland — Helsinki, Finland (News in Finnish)

1100	YLE Radio Finland — Helsinki, Finland (Variable programming in Finnish—often light music)
1200	Interval signal
1300	Voice of Russia — Moscow, Russia (Russian Programming)
1400	Radio Vlaanderen International — Brussels, Belgium (Brussels Calling with Dutch programming)
1430	Identification tone
1630	Radio Austria International — Vienna, Austria (German Programming)
1700	Radio Budapest — Budapest, Hungary (Hungarian Programming)
1800	Polish Radio — Warsaw, Poland (Polish programming)
1830	YLE Radio Finland — Helsinki, Finland (Devotional programming in Finnish)
1855	YLE Radio Finland — Helsinki, Finland (News in Finnish)
1900	YLE Radio Finland — Helsinki, Finland (News of the past 24 hours in Finnish)
1925	YLE Radio Finland — Helsinki, Finland (News in Swedish)
1930	YLE Radio Finland — Helsinki, Finland (French programming)
1945	YLE Radio Finland — Helsinki, Finland (Light music in Finnish)
2030	YLE Radio Finland — Helsinki, Finland (Easy listening music). Announcements partially in English. Saturdays a phone-in for children in Finnish
2100	YLE Radio Finland — Helsinki, Finland (Documentaries and Theater of the Air in Finnish). Sunday: Classical music with a preview in English.
2200	YLE Radio Finland — Helsinki, Finland (English programming)
2230	YLE Radio Finland — Helsinki, Finland (Newsroundup in Finnish)
2300	Interval signal
2330	Radio Austria International — Vienna, Austria (German programming)

WRN One English to Eastern Europe, Middle East and Africa

Intelsat 707, 1 degree West, 3.9115 GHz, Right-Hand Circular-Polarization, Symbol Rate 8.022 Mbaud, FEC 3/4, MPEG2 Audio Stream "WRN." WRN can also be heard overnight in South Africa on [SAfm 104-107] from 2300 to 0400 UTC daily. WRN can be heard in South Africa on the [MultiChoice] digital direct-to-home service on PanAmSat 4, 68.5 degree East, Audio Channel 51. All times are Central African Time (UTC +2).

Time	Station
Next five hours can be heard in South Africa on SAfm 104-107	
0000	Radio Netherlands — Hilversum, Netherlands
0057	<i>Earth & Sky</i> (Daily Science Series)
0100	Radio Telefis Eireann (RTE) — Dublin, Ireland
0200	Monday-Friday: Radio Australia — Melbourne, Australia Saturday: YLE Radio Finland — Helsinki, Finland Sunday: United Nations Radio — New York, NY USA
0230	Monday-Friday: Swiss Radio International — Berne, Switzerland Saturday: Radio Sweden — Stockholm, Sweden Sunday: Polish Radio — Warsaw, Poland
0300	National Public Radio <i>All Things Considered</i>
0400	Tuesday-Saturday: Public Radio International <i>The World</i> Sunday: National Public Radio <i>Weekly Edition</i> Monday: National Public Radio <i>Fresh Air Weekend</i>
0500	Radio Telefis Eireann (RTE) — Dublin, Ireland (Irish Collection)
0600	Tuesday-Saturday: Public Radio International <i>Market Place</i> Sunday: Radio New Zealand International — Wellington Monday: Radio Denmark — Copenhagen, Denmark (Copenhagen Calling)
0630	Radio Budapest — Budapest, Hungary
0700	National Public Radio <i>All Things Considered</i> (repeat)
0800	Polish Radio — Warsaw, Poland
0830	Radio Vlaanderen International — Brussels, Belgium (Brussels Calling)
0900	Radio Telefis Eireann (RTE) — Dublin, Ireland
1100	Voice of Russia — Moscow, Russia
1130	Radio Netherlands — Hilversum, Netherlands
1230	YLE Radio Finland — Helsinki, Finland
1300	Radio Australia — Melbourne, Australia
1400	Radio Canada International — Montreal, Canada
1500	Radio Telefis Eireann (RTE) — Dublin, Ireland
1600	Swiss Radio International — Berne, Switzerland
1630	Radio Austria International — Vienna, Austria
1700	Radio France International — Paris, France
1800	Monday-Friday: Caribbean Tempo from CANA Radio
1815	Monday-Friday: Vatican Radio — Vatican City (World News) Saturday: Glenn Hauser's <i>World of Radio</i> Sunday: Radio Denmark — Copenhagen, Denmark (Copenhagen Calling)
1830	Radio Austria International — Vienna, Austria
1900	Monday-Saturday: Channel Africa — Auckland Park, South Africa Sunday: <i>Norden This Week and Health Watch</i> (Sun)
1930	Radio Telefis Eireann (RTE) — Dublin, Ireland
2000	Radio Vlaanderen International — Brussels, Belgium (Brussels Calling)
2030	Radio Netherlands — Hilversum, Netherlands
2127	<i>Earth & Sky</i> (Daily Science Series)

SATELLITE RADIO GUIDE



INTERNATIONAL SHORTWAVE BROADCASTERS / SCPC SERVICES

2130 Polish Radio — Warsaw, Poland
2200 Radio France International — Paris, France
2300 Voice of America — Washington, DC USA

WRN One English to Asia-Pacific

AsiaSat-2, 100.5 degrees East, 4.000 GHz, Vertical-Polarization, MPEG2 DVB, Symbol Rate 28.125 Mbaud, FEC 3/4, Select "WRN" from audio menu. All times are Australian Eastern Time (UTC/GMT +10). For Hong Kong add eight hours to UTC.

Time	Station
0000	Swiss Radio International — Berne, Switzerland
0030	Radio Austria International — Vienna, Austria
0100	Radio France International — Paris, France
0200	Monday-Friday: Caribbean Tempo from CANA Radio
0215	Monday-Friday: Vatican Radio — Vatican City (World News) Saturday: Glenn Hauser's World of Radio Sunday: Radio Denmark — Copenhagen, Denmark (Copenhagen Calling)
0230	Radio Austria International — Vienna, Austria
0300	Monday-Saturday: Channel Africa — Auckland Park, South Africa Sunday: Norden This Week & Health Watch
0330	Radio Telefis Eireann (RTE) — Dublin, Ireland
0400	Radio Vlaanderen International — Brussels, Belgium (Brussels Calling)
0430	Radio Netherlands — Hilversum, Netherlands
0527	Earth & Sky (Daily Science Series)
0530	Polish Radio — Warsaw, Poland
0600	Radio France International — Paris, France
0700	Voice of America — Washington, DC USA
0800	Radio Netherlands — Hilversum, Netherlands
0857	Earth & Sky (Daily Science Series)
0900	Radio Telefis Eireann (RTE) — Dublin, Ireland
1000	Monday-Friday: Radio Australia — Melbourne, Australia Saturday: YLE Radio Finland — Helsinki, Finland Sunday: United Nations Radio — New York, NY USA
1030	Monday-Friday: Swiss Radio International — Berne, Switzerland Saturday: Radio Sweden — Stockholm, Sweden Sunday: Polish Radio — Warsaw, Poland
1100	National Public Radio All Things Considered
1200	Tuesday-Saturday: Public Radio International The World Sunday: National Public Radio Weekly Edition Monday: National Public Radio Fresh Air Weekend
1300	Radio Telefis Eireann (RTE) — Dublin, Ireland (Irish Collection)
1400	Tuesday-Saturday: Public Radio International Market Place Sunday: Radio New Zealand International — Wellington Monday: Radio Denmark — Copenhagen, Denmark (Copenhagen Calling)
1430	Radio Budapest — Budapest, Hungary
1500	National Public Radio All Things Considered (repeat)
1600	Polish Radio — Warsaw, Poland
1630	Radio Vlaanderen International — Brussels, Belgium (Brussels Calling)
1700	Radio Telefis Eireann (RTE) — Dublin, Ireland
1900	Voice of Russia — Moscow, Russia
1930	Radio Netherlands — Hilversum, Netherlands
2030	YLE Radio Finland — Helsinki, Finland
2100	Radio Australia — Melbourne, Australia
2200	Radio Canada International — Montreal, Canada
2300	Radio Telefis Eireann (RTE) — Dublin, Ireland

Single Channel Per Carrier (SCPC) Services

By Robert Smathers
roberts@nmia.com

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The frequency in the first column is the 1st IF (typical LNB frequency) and the second column frequency (in parentheses) is the 2nd IF (commercial receiver readout) for the SCPC listing. Both frequencies are in MHz.

GE-2 Transponder-Vertical 13 (C-band)

1178.70 (81.3) NASA space shuttle audio

GE-3 Transponder-Horizontal 13 (C-band)

1207.90 (52.1) Wisconsin Voice of Christian Youth (VCY) America Radio Network—religious programming
1204.25 (55.75) Wisconsin Voice of Christian Youth (VCY) America Radio Network—religious programming
1204.00 (56.0) SRN (Salem Radio Network) News
1201.50 (58.5) Wisconsin Voice of Christian Youth (VCY) America Radio Network—religious programming
1201.30 (58.7) Wisconsin Voice of Christian Youth (VCY) America Radio Network—religious programming

Galaxy 6 Transponder 1-Horizontal (C-band)

1443.80 (56.2) Voice of Free China (International Shortwave Broadcaster) Taipei, Taiwan
1443.60 (56.4) KBLA-AM (1580) Santa Monica, CA—Radio Korea
1443.40 (56.6) Voice of Free China (International Shortwave Broadcaster) Taipei, Taiwan
1438.30 (61.7) WWRV-AM (1330) New York, NY—Spanish religious programming and music, ID—Radio Vision Christiana de Internacional
1436.50 (63.5) West Virginia Metro News—network news feeds

Galaxy 6 Transponder 3-Horizontal (C-band)

1404.80 (55.2) KOA-AM (850)/KTLK-AM (760) Denver, Colo—news and talk radio/Colorado college sports
1404.60 (55.4) WGN-AM (720) Chicago, IL—news and talk radio/Northwestern college sports
1404.40 (55.6) Illinois News Network—network news feeds/WMPV-AM (1000) Chicago, IL—talk/Chicago Blackhawks NHL radio network
1404.20 (55.8) Tribune Radio Networks/Wisconsin Radio Network
1402.70 (57.3) WLAC-AM (1510) Nashville, TN—news and talk/Road Gang trucker program (overnight)/Tennessee college sports



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SATELLITE RADIO GUIDE



SINGLE CHANNEL PER CARRIER (SCPC) SERVICES

1402.20 (57.8)	NorthWest Ag News Network - Agriculture info for the Pacific Northwest	1377.10 (82.9)	radio/Washington State college sports	SBS5 Transponder 2-Horizontal (Ku-band)	
1402.00 (58.0)	Occasional audio/Clemson college sports	1376.00 (84.0)	In-Touch-reading service	1013.60 (80.4)	Wal-Mart in-store network
1401.50 (58.5)	USA Radio Network		Kansas Audio Reader Network-reading service	1013.20 (80.8)	Wal-Mart in-store network
1399.50 (60.5)	Occasional audio	1375.40 (84.6)	USA Radio Network/Agrinet Agriculture news service	1012.80 (81.2)	Sam's Wholesale Club in-store network
1399.20 (60.8)	Occasional audio			1004.00 (87.0)	Wal-Mart in-store network
1399.00 (61.0)	Sports Byline USA/Sports Byline Weekend	Galaxy 6 Transponder 4-Vertical (C-band)		1004.00 (90.0)	Wal-Mart in-store network
1398.50 (61.5)	Occasional audio	1376.00 (64.0)	Data Transmissions	1003.60 (90.4)	Sam's Wholesale Club in-store network
1398.30 (61.7)	WSB-AM (750) Atlanta, GA- news/talk/Georgia college sports	Galaxy 6 Transponder 6-Vertical (C-band)		1003.20 (90.8)	Wal-Mart in-store network
1398.00 (62.0)	Occasional audio	1347.00 (53.0)	WCRP-FM (88.1) Guayama, PR- Spanish language religious program-ming	RCA C5 Transponder 3-Vertical (C-band)	
1397.80 (62.2)	Occasional audio/Colorado Avalanche NHL radio network			1404.80 (55.2)	RFD Radio Service
1397.50 (62.5)	Minnesota Talking Book Radio Network-reading service for the blind	Anik E2 Transponder 1-Horizontal (C-band)		1404.60 (55.4)	Wyoming News Network-network news feeds/Northern Sports Network/Wyoming college sports
1397.10 (62.9)	Wisconsin Radio Network/Wisconsin college sports	1446.00 (54.0)	Canadian Broadcasting Corporation (CBC) Radio-North (Quebec) service	1400.60 (59.4)	Learfield Communications/Indiana college sports
1396.90 (63.1)	Occasional audio	Anik E2 Transponder 7-Horizontal (C-band)		1400.40 (59.6)	Learfield Communications/MissouriNet
1396.70 (63.3)	Radio America Network	1326.00 (54.0)	Canadian Broadcasting Corporation (CBC) Radio-North (Eastern Arctic) service	1400.20 (59.8)	Occasional audio/Data transmissions
1396.40 (63.4)	Georgia News Network (GNN)-network news feeds	Anik E2 Transponder 13-Horizontal (C-band)		1400.00 (60.0)	Learfield Communications/Purdue college sports
1396.00 (64.0)	WHO-AM (1040) Des Moines, IA-talk radio/Iowa News Network-network news feeds/Iowa college sports	1206.00 (54.0)	Canadian Broadcasting Corporation (CBC) Radio-North (MacKenzie) service	1396.60 (63.4)	Kansas Information Network/Kansas Agnet-network news feeds/Southwest Missouri State college sports
1395.80 (64.2)	WTMJ-AM (620) Milwaukee, WI-talk radio/Wisconsin college sports	1205.00 (54.5)	Canadian Broadcasting Corporation (CBS) Radio-Occasional feeds/events	1396.40 (63.6)	Liberty Works Radio Network - talk radio
1395.60 (64.4)	WGST-AM/FM (640/105.7) Atlanta, GA ID Planet Radio-news and talk radio	Anik E2 Transponder 17-Horizontal (C-band)		1396.20 (63.8)	MissouriNet/Illinois college sports
1395.40 (64.6)	Michigan News Network-network news feeds/Michigan college sports	1126.00 (54.0)	Canadian Broadcasting Corporation (CBC) Radio-North (Western Arctic) service	1396.10 (63.9)	Occasional audio/Illinois college sports
1395.00 (65.0)	Occasional audio	1125.50 (54.5)	Canadian Broadcasting Corporation (CBC) Radio-North (Newfoundland and Labrador) service	1395.90 (64.1)	Western Montana Radio Network/Red River Farm Network/Montana college sports
1394.70 (65.3)	WJR-AM (760) Detroit, MI-news and talk radio/Michigan News Network	Anik E2 Transponder 23-Horizontal (C-band)		1395.70 (64.3)	MissouriNet/Kansas State college sports
1394.50 (65.5)	XEPRS-AM (1090) Tijuana, Mexico-Spanish language programming	1006.00 (54.0)	Societe Radio-Canada (SRC) Radio-AM Network	1386.40 (73.6)	Learfield Communications
1394.30 (65.7)	Michigan News Network/Michigan State college sports	1005.50 (54.5)	Canadian Broadcasting Corporation (CBC) Radio-North (Yukon) service	1386.20 (73.8)	Radio Iowa/Iowa college sports
1385.40 (74.6)	WDUQ-FM (90.5) Pittsburgh, PA - Jazz format	Solidaridad 1 Transponder 1-Vertical (C-band)		1386.00 (74.0)	United broadcasting Network-talk radio
1384.60 (75.4)	WDUQ-FM (90.5) Pittsburgh, PA - Jazz format	1447.90 (52.1)	Antenna Radio Noticias	1384.60 (75.4)	Capitol Radio Network/North Carolina State college sports
1384.40 (75.6)	KOA-AM (850)/KTLK-AM (760) Denver, CO-news and talk radio/Colorado college sports	1447.60 (52.4)	Antenna Radio Noticias	1384.00 (76.0)	Occasional audio/ABC Direction Network-network news feeds
1384.20 (75.8)	WSB-AM (750) Atlanta, GA - news/talk/Georgia college sports	1447.20 (52.8)	La Grande Cadena Raza	1383.80 (76.2)	Occasional audio/Syracuse college sports
1383.70 (76.3)	Motor Racing Network (occasional audio) NASCAR racing	1447.00 (53.0)	XEMZA-AM 560, Manzanillo, Mexico	1383.40 (76.6)	Capitol Radio Network/North Carolina college sports
1383.10 (76.9)	KIRO-AM (710) Seattle, WA-news and talk radio	Anik E1 Transponder 21-Horizontal (C-band)		1382.90 (77.1)	MissouriNet/Missouri college sports
1382.60 (77.4)	Soldiers Radio Satellite (SRS) network-U.S. Army information and entertainment radio/Army college sports	1036.70 (63.3)	In-store music	1382.50 (77.5)	Virginia News Network-network news feeds
1382.00 (78.0)	Occasional audio	1037.00 (63.0)	In-store music	1382.10 (77.9)	Learfield Communications/MissouriNet/Illinois college sports/Blues NHL radio network
1381.60 (78.4)	KEX-AM (1190) Portland, OR-news and talk radio	1037.50 (62.5)	In-store music		
1381.40 (78.6)	Occasional audio				
1381.20 (78.8)	KJR-AM (950) Seattle, WA- sports talk				

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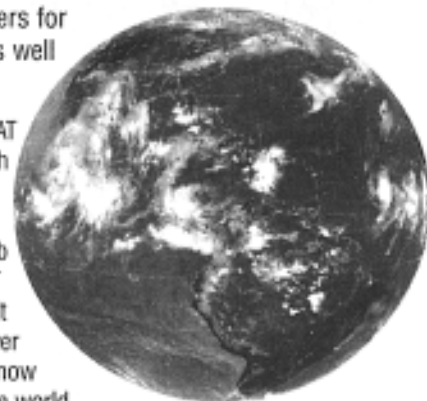


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Let's Accessorize!

Did you ever notice how none of us are ever satisfied with the way things are? If we were, we'd all still be listening to AM radio and thinking we had really done something. We'd be thrilled to hitch up the mules and drive to town once a week for groceries. Instead, we're buying sport utility vehicles with little wipers on the headlights and we're listening to radios that can tune from seismic plate movements to quasars.

■ The Satellite TV Craze

What's fun about having a hobby is accessorizing. This is why you can't do DBS satellite TV as a hobby. There's nothing left to do. You plug it in, turn it on, flip through the channels and go to bed. Not so with the big dish systems. There's no end to the time and money which can be poured into these things. And that, my fellow denizens of the Clarke Belt, is the very definition of a hobby: That place where all your spare time and money goes.

Years ago, when the cable-TV industry was switching over to satellite delivery of programming, a couple of enterprising ham radio-type tinkers home-brewed enough microwave parts together to actually pick up the signals from those satellites. Word spread throughout the world of ham radio-type tinkers that this was a cool way to spend your excess time and money. It was not for the idly curious or the financially unendowed. In those days a 150°K LNA would cost about \$600. If you scrounged really hard, knew a few folks in the microwave technology field who could sell you some surplus parts, you could put a system together to watch the three satellites in use for under \$10,000! That was 20 years ago.

By 1994 the small dish revolution had begun and the world of big dish satellite TV

was once again the domain of hobbyists. Those who stuck with their big dishes have found there's still plenty of tinkering to be done. Now, let's take a look at some accessories you might find useful in this hobby.

■ TVRO Accessory Parade:

Expanding Your Listening Horizons

- Two products which don't get covered a lot are strictly for the radio monitor in us all. Both are made by Universal Electronics and allow listeners to tune into audio sources not covered by any other satellite receiver. The first is the **Universal SC-50** which is capable of tuning FM subcarriers as low as .10 MHz. The region from .10 to 8.00 MHz is where dozens of signals are found on Anik E1, Galaxy 3R (Ku-band), and GE-3. These services range from religious networks to AP Radio Network, dozens of in-store music services and Muzak®. The Nova Network on Anik E1 is the only way Americans can tune into Toronto Blue Jays baseball.

The **Universal SCPC-200** is a consumer version of a commercial Single Channel Per Carrier receiver sold to the broadcast industry. That doesn't mean it's short on capabilities, it just means it's a lot cheaper. SCPC is the method by which radio networks get their signals to affiliates. Narrowband FM signals are transmitted to the satellite on their own very carrier and, unlike their audio subcarrier counterparts, require no video carrier to get to the satellite. This means you can cram dozens of SCPC signals on one transponder. The SCPC-200 tunes them in.

An updated list of SCPC services is found in the Satellite Radio Guide section of *MT*. Here you'll find several reading services for the sight impaired, one terrific full-time non-

commercial jazz channel, Radio Martí, Space Shuttle audio, and programming in Spanish, Chinese, Korean, Russian, and at least eight Canadian CBC channels.

Both the SC-50 and SCPC-200 are monaural. Both have 50 channel memory capabilities and use an easy-to-read, backlit, liquid crystal display. Both are designed to be used as add-on units to your current satellite receiver which powers the LNB. The SC-50 requires a baseband video output on your satellite receiver. The SCPC-200 can be used as a splitter for your LNB output.

- One of the first things to get axed when designers try to make a cheaper satellite receiver is the signal meter. You're not supposed to need one anyway. Your dealer is supposed to set it up and you should expect it to run perfectly from then until you die, move or give up on TV. But, in the real world, TVRO hobbyists are always peaking the dish or trying to find a newly launched satellite, a task made much easier if there is some way of seeing a signal from a satellite by looking at a meter.

Samsonics has a solution with their **Satellite Finder**. This nifty little meter plugs in-line either at the dish when you're peaking it for optimum reception or at the receiver when you're trying to locate a new satellite.

It's a relative strength meter which means that you set it to read at the center point on the meter when you're on a satellite. Any decrease in the needle and there's



Samsonic's Signal Meter shows when a satellite signal is present even if there's no video. Use it to peak your system and hunt for new birds. (Courtesy: Samsonics)



Universal Electronics makes both the SCPC-200 and the SC-50, two accessories which will increase your satellite TV enjoyment. (Courtesy: Universal Electronics)

less signal getting through, any increase in the needle shows you're getting more signal. It's tough to judge the quality of a signal by looking at a TV picture but the needle on the meter is sensitive to very slight increases or decreases. If you don't have a meter built into your receiver, you need this little device to make installation or realignment a snap.

- There are four other items you should consider when thinking about adding to your existing big dish satellite system. The first is a **DVB digital satellite receiver** (of which I've written extensively in the last couple of months). At \$400 they tend to be pricey additions, but, considering the value of over a hundred different and interesting channels, well worth the cost.

Second is the addition of a **DSS feed horn/LNB** which allows you to watch DirecTV or USSB via your big dish. You'll still need a separate DSS receiver and subscription to programming, but, it can be done.

Third is a **DMX® digital audio receiver** which, at \$500 to \$600, is quite expensive. But, for audiophiles, nothing on any cable

system or small dish system compares to the 95 channels of CD quality stereo uninterrupted and commercial-free. The \$15 dollars/month you pay for a yearly subscription is like buying one CD a month.

The fourth item is a **36" actuator motor**. Though expensive (around \$400) this extra long motor drive allows you to travel from horizon to horizon and can be added to any dish which currently uses a linear actuator arm. From my location I can see from Satcom C5 at 139° West all the way East to Intelsat 605 at 27.5° W. If you're interested in the dozens of international channels on the Intelsat birds you must have a 36" actuator, a DVB receiver and an ADL international C/Ku feed horn for left- and right-hand circularly polarized feeds.

■ Mailbag

- Henry Yamauchi writes from New York City that he has limited space for a dish and wants to know what the smallest dish is that he could use; if he can compensate for a small dish by having a better quality LNB; and if only wanting audio would make a difference on the size required.

Excellent questions, Henry, and it has prompted me to think about doing a "Cramped Space" satellite TV column in the near future. Satellite TV signals, regardless of whether you are tuning in video or audio, are like any other: the bigger the antenna, the better the reception. Now, of course, not everyone can put up a 10-foot dish, so compromises have to be made. Better grade LNBs do make a difference, though you can't expect a great LNB to make a 4-foot dish receive like a 10-foot dish. Still, getting the lowest noise temperature LNB you can afford is a good idea.

- Bob Gibson lives in Washington, D.C., and notes that some area PBS affiliates have started carrying BBC World. He wants to know where this feed is coming from.

Well, Bob, most likely it's coming from Panamsat 5 (58° West) where the BBC has a 24 hour a day feed of BBC World in DVB digital format. It may also be coming from a DigiCipher II affiliate feed on one of PBS' many DCII channels taped from the Panamsat 5 feed.

- Judy May writes via E-mail that she's excited about receiving satellite transmissions and has a number of basic questions and wants to know if there is a book that might help get her started in the hobby.

Unfortunately, Judy, the one cheap book which was useful (*The Satellite Broadcasting Guide*) is no longer published. That leaves some pretty pricey, but very informative books. Tops on my list would be Frank Baylin's

1998/2000 *World Satellite Yearly*, but, at \$90 it's not cheap. The cheapest alternative is to stay tuned to the "Launching Pad" and throughout the next year you'll get right up to speed.

■ Quiz Time

Yes, at long last I'm getting around to answering the quiz which was in the November Launching Pad. The question was: "Name the year and the satellite on which the first radio waves were received on Earth." I was surprised to learn that despite the many responses via E-mail and snail mail there were no correct answers.

The correct answer was: The Moon. The date was Jan. 10, 1946. The frequency was 112 MHz with the first reception of non amateur Earth-Moon-Earth echoes. Now, as I said, this was a question which would require "...a little research." My source is *The Satellite Experimenter's Handbook* by Martin Davidoff, 2nd edition, page 2-12. As Casey Stengle used to say, "... you can look it up!"

OK. Are you up for another quiz? At the beginning of this month's column I refer to "ham-type tinkerers" who virtually invented the home satellite TV industry. Name the person and the date of the first American reception of satellite TV signals. My deep appreciation to all readers who took the time to respond.

SOURCES FOR ITEMS MENTIONED IN THIS MONTH'S COLUMN

SC-50/SCPC-200:

Universal Electronics, Inc.
4555 Groves Road Suite 12
Columbus, OH 43232 (614) 866-4605

Meter:

Samsonic Technology USA, Inc.
2182 DuPont Drive Suite 203
Irvine, CA 92612 888-591-4416
www.samsonic.com

Add-on DSS:

Astrotel Communications Corp.
17906 Crusader Avenue
Cerritos, CA 90703
310-403-7036

DMX® receiver:

Digital Music Express
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www.dmxmusic.com

36" actuator:

Skyvision
800-543-3025
www.skyvision.com

International feed horn:

ADL
2216 Agate Ct. #B
Simi Valley, CA 93065
805-526-5249 www.thegrid.net/adl/

98/2000 World Satellite Yearly:

Baylin Publications
303-449-4551
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Getting Started in Amateur Radio

If you are like most recent converts to shortwave monitoring, you have probably stumbled around in the region known as the 41 meter band (7100 through 7300 kHz). As you try to tune in to the 41 meter broadcast of Radio Free Freedonia, you have probably encountered the minor annoyance of stations transmitting in International Morse Code or in the now familiar “duck quack” of single sideband (SSB).

What you are hearing are the signals sent out by amateur radio operators. Hams have access to a portion of frequencies known as the 40 meter band (7000 through 7300 kHz). As you can see, ham radio and the 41 meter broadcast band overlap substantially! What is a budding DXer to do?

Why not join them? Be honest for a second... Haven't you ever entertained the notion that it might be fun to transmit radio signals as well as receive them? Most of you have probably hit the lower sideband control on your receiver and listened in on the conversations scattered among the big broadcasters.

Such monitoring often piques a person's interest in becoming an amateur radio operator. But this is often easier said than done. How can a beginner in the radio hobby find out about how to get in on the fun of ham radio?

■ Uncle Skip's Guide to Becoming a Ham

Amateur radio privileges are grouped (more or less) according to ability, experience and training. I say “more or less” because you will often find more qualified hams communicating with beginners, helping them to learn all about this exciting facet of the radio hobby. All it takes to begin enjoying ham radio is an amateur radio license.

You qualify for a ham license by taking a series of examinations. These exams are known as elements. The class of amateur radio license you qualify for depends upon which elements you pass. Don't let the idea of a whole passel of tests scare you, folks. What the element structure really does is break down the process of developing as an amateur radio operator into easy-to-master, bite-sized segments.

As this column goes to press there are five classes of amateur radio licenses, each with different privileges. I make this point because it is currently the intention of the Federal Communication Commission (FCC) to restructure the number of licenses and the ease of entry into the ham radio hobby. Until that particular

shoe drops, however, we will concentrate to the two essential entry level license classes as they appear currently on the FCC's books. These are known as the Novice and Technician licenses.

■ To Code or not to Code: That is the Question

A number of years back, FCC regulations pertaining to amateur radio removed the code test requirement from the Technician class of license. Over the years some folks have felt that the requirement to learn the International Morse Code served as a barrier to people who wanted to become hams. As we look at the requirements for each of the entry level ham tickets, you will see that it makes a certain amount of sense to give code the old college try.

If you can develop this skill quickly, so much the better. However, the current licensing structure allows you to begin to enjoy the excitement of amateur radio before your skills with the code have fully developed. Anyway, if you have long stood by the excuse that you could never become a ham because “the code is too much of a hassle” you now have to seek out a new excuse to avoid all the fun. The proposed rule changes that are currently being considered by the FCC will probably still require some code ability for more advanced ham licenses so, while code no longer blocks a person's entry into the ham hobby, it is likely to count towards higher licensing for the foreseeable future.

■ The Novice License

Novices can operate in the HF portion of the radio spectrum on 3675 through 3725 kHz in the 80 meter band, 7100 through 7150 kHz in the 40 meter band, and 21100 through 21200 kHz in the 15 meter band using **telegraphy**. This means transmitting in International Morse Code. Novices also have Single Sideband voice privileges in the HF bands on 28300 through 28500 kHz in the 10 meter band.

Although as a Novice you are limited to 200 watts of power on these bands, you will be down among all those international shortwave broadcasters having the time of your life. Believe it or not, that 200 watts will get you around the world with relative ease. As a shortwave listener, HF transmitting is as close to your regular listening practices as you can get. All you have learned about propagation and listen-

ing patterns from SWLing will be of good use to you as you reach out across the Novice HF frequencies.

Novices also have the ability to use certain VHF frequencies. As a Novice you can operate from 222.1 through 223.91 MHz with 25 watts of power and from 1270 through 1295 MHz with 5 watts of power. In these VHF frequencies you can experiment with all authorized modes of amateur communication including radioteletype (RTTY) and the “digital” modes such as packet radio. These VHF privileges serve to wet your whistle for all that is available to you under the Technician class of license.

To qualify for the Novice ticket you must currently pass elements 1A and 2. Element 1A is a test of your ability to understand International Morse Code sent at 5 words per minute. Element 2 is a 35 question multiple choice examination on basic radio theory and operating regulations.

One of the most discussed aspects of the current proposed rule changes is that the new structure will likely eliminate the Novice class license. It may still be worth your while to study and pass this test as soon as possible because some proposals for “grandfathering” Novice class folks have included privileges all the way up to the current General class license. That's a lot of new bandwidth for no extra effort, so get studying so you won't miss out!

■ The Technician License

Just as some facets of the Novice license might hold special appeal to the shortwave listener, the Technician ticket will especially excite the scanner monitors out there in *MT* land. You see, Technician class privileges give you access to all amateur radio frequencies and modes of operation above 50 MHz, the realm of VHF and UHF. A Tech ticket buys you 50 MHz through 54 MHz, 144 through 148 MHz, 222 through 225 MHz (sorry folks, we just lost 220 through 222 MHz; you should have hopped on board sooner), 420 through 450 MHz, 902 through 928 MHz, and 1240 through 1300 MHz. And to make the pot even sweeter, you can use all kinds of modes of communication including code, voice, data, RTTY, and TV.

As any serious scanner person can tell you, there are many exciting propagation features to the VHF world. Signals can go extreme distances thanks to tropospheric ducting, sporadic “E” layer skip, and meteor scatter. What I always liked about VHF ham operation is that

the antennas are physically smaller and lend themselves to a great deal of experimentation.

To qualify for your Technician class license, you must sit for elements 2 and 3A. As we said before, element 2 is the Novice theory and regulations, 35 multiple choice questions. Element 3A is an additional 25 multiple choice questions on Technician class theory and regulations. 55 questions in all (And no code test). You can operate forever in the VHF world or later study the code and pass element 1A and add Novice class HF privileges to your quiver. The current "No Code" Technician's class license is likely to change the least under the proposed restructuring, because it has become, over recent years, the de facto entry level license.

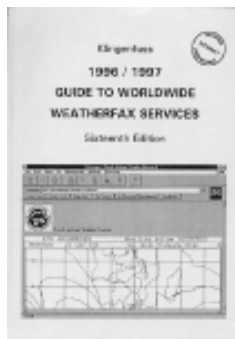
■ How to Study

Fortunately, hams are a gregarious lot. They like to see that everyone gets a chance to join in the fun of amateur radio. Many companies have produced study guides to help you prepare for whatever level of ham license your little old heart desires. You can find many of these resources listed in the ads in *MT*.

The best single source study guide for beginners covering both the Novice and the Code-Free Technician Class licenses is *Now You're*

Talking: Discover The World of Ham Radio, \$19.00 plus \$4.00 shipping, published by The American Radio Relay League, 225 Main Street, Newington, CT 06111. This book will work you through all the theory and regulations including the complete question pools for the multiple choice questions that will make up elements 2 and 3A. It even gives you solid information about how to get on the air once you pass your exam.

If you choose to go the Novice class route, you also will need some assistance in learning the International Morse Code. As with books, many sources can be found for code training cassettes. Again, the ARRL produces *Your Introduction to Morse Code* audio compact disk set #5811, \$12.00 plus \$3.00 shipping and handling. These audio CDs (also available as cassettes) teach you all the letters and numbers and bring you up to speed to pass the 5 WPM test that makes up element 1A. Once you have learned the code, you can get further practice



by listening in on the Novice class code frequencies listed above.

■ Where Can I Take the Tests?

Back when Old Uncle Skip was first licensed, I had to trudge on over to the Philadelphia Customs House where the FCC used to have its field office. A few years back, the Volunteer Examiners Program was established, making it possible for qualified hams to run exams for all classes of licenses.

You can obtain a list of Volunteer Examining Teams in your area by once again writing to the ARRL's Educational Activities Department at the same address listed above. You can also check out their website at www.arrl.org for up-to-date information. If you are a scanner monitor, you might listen in to your area ham repeaters. Sometimes, organized nets give information about upcoming test sessions in your neck of the woods. Also, most hamfests will have VEC testing as part of the program.

One of the best parts of the proposed restructuring of the amateur license structure is that it is not likely that any current licensee will lose any of their privileges. Rather, current proposals include some additional bandwidth for all. So join in the fun! Ham radio is a great way to expand your radio interests.



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Using Primary Data

During November I was able to bring my METEOSAT Primary Data User Station (PDUS) back into operation. I originally bought the PDUS system in 1992 on a now-or-never basis (following the onset of unemployment). To receive Primary Data you require a large dish — a minimum diameter of 1.6m is essential. My original system operated satisfactorily for about a year until a severe storm blew the dish over and damaged its shape. Since that time my concerns have been elsewhere and the dish remained unusable, so I reverted to weather facsimile (WEFAX) reception.

A few weeks ago I set up a replacement C-band dish on a proper mount, and fitted a new S-band feed. For test purposes I obtained a WEFAX signal to align the dish. I connected the PDUS receiver and adjusted the dish to get the best signal. This was a long process.

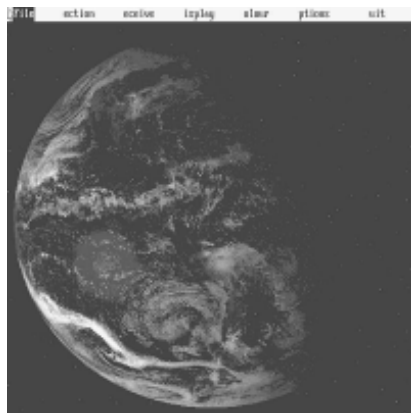
Unlike GOES, METEOSAT-7 transmits encrypted data in all but a few slots. This means that image quality can only be checked during the transmission of test formats and “foreign” images — unencrypted “home” images only being available every six hours! It is peculiar having to set up such an advanced system only during transmissions originating from GOES-8, GOES-10, GMS-5, or INDOEX. The result was worth the trouble of lengthy adjustments when images from GOES-8 and GOES-10 finally became available as you’ll see later.

■ Operating WXSATs

On December 1, 1998, NOAA-15 became one of the two primary operational Polar Orbiting Environmental Satellites (POES) maintained by the National Environmental Satellite, Data, and Information Service (NESDIS). NOAA-12 then became a secondary (backup) satellite. The second primary operational POES is NOAA-14.

In backup mode, NOAA-12 will continue to transmit advanced very high resolution radiometer (AVHRR) data — high resolution picture transmission (HRPT) and automatic picture transmission (APT) — and support search and rescue operations. Steve Arnett of the Satellite Analysis Branch, NOAA/NESDIS/SSD supplied this information.

The sun’s elevation is low during northern



winter days, so visible-light images from the northbound passes of NOAA-14 appear very dark. They actually contain much data, so applying mild contrast enhancement can work wonders. Near the end of each afternoon pass, ground illumination reduces to a level where the satellite switches the down-linked APT from the visible-light channel to the near-infra-red channel. This produces a significant change in the components that make up the final decoded 2.4 kHz tone that we hear as the characteristic weather satellite (WXSAT) sound. The APT sound changes from the *high-low* tones to *high-high* tones.

Another component that can readily be heard is the minute marker at the side of each of the two APT channel frames. Knowing how to interpret the audio content of APT signals seems to add greatly to the experience of satellite monitoring!

METEOR 3-5 has been passing southbound during the day, transmitting APT on 137.85 MHz as normal. Transmissions only occur in sunlight, so when the satellite comes over the North Pole during a southbound pass, it remains silent. On crossing into sunlight it resumes transmissions. At the beginning of its life Meteor 3-5 transmitted some excellent infra-red images, but these ended — as did those from earlier Meteors — within a few weeks. My understanding is that equipment failure was responsible.

■ Weather Data from the geostationary WXSATs

For many years we have had the benefit of the WXSATs located at specific longitudes at

the geostationary orbit distance of 35,790 km. These satellites are owned by the United States of America, Europe, India, Japan, and the Russian Federation, and provide a continuous view of the weather from about 70 North to 70 South.

The Coordination Group for Meteorological Satellites (CGMS) has provided a forum for satellite operators from members of the World Meteorological Organization to harmonize the technical and operational aspects of the global network. This should ensure the greatest effectiveness in the design of the satellites and in data acquisition and dissemination procedures. Satellite designs are still based on national and regional requirements for data and services, so some differences are inevitable.

The GOES spacecraft can view the 48 states, and major portions of the central and eastern Pacific Ocean, and the central and western Atlantic Ocean areas. Pacific coverage includes the Hawaiian Islands and the Gulf of Alaska, the latter known to weather forecasters as “the birthplace of North American weather systems.” The Atlantic and Pacific basins strongly influence the weather affecting the United States, so coverage is provided by two GOES spacecraft, one at 75° west longitude (GOES East), and the other at 135° west longitude (GOES West).

At least one GOES spacecraft is always within line-of-sight view of earth-based terminals and stations. The Command and Data Acquisition (CDA) Station is in line-of-sight to both spacecraft and can uplink commands and receive downlinked data from each simultaneously. Ground terminals can receive processed environmental data and weather facsimile (WEFAX) transmissions.

■ Primary Data images from around the world

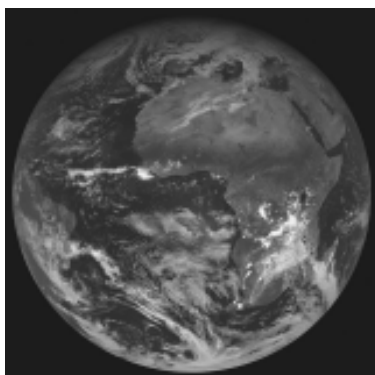
The weather satellite pictures shown in this edition were all obtained directly from my own PDUS equipment, not the Internet. METEOSAT-7 is positioned over longitude 0 (London, UK) from where it views the eastern Atlantic Ocean, South Africa, and parts of western Europe.

It uses two frequencies for image transmission: 1691.00 and 1694.5 MHz. The former is

used for WEFAX products, the latter for Primary Data and more WEFAX formats. Primary Data formats include images from METEOSAT-7 itself, together with those from GMS-5, METEOSAT-5, GOES-E and GOES-W. GOMS-1 is currently non-operational, and I have not been able to collect any FENG-YUN-2B images.

GVAR PDUS (GOES variable format primary data) is transmitted from GOES-E and GOES-W on 1685.7 MHz.

Technically, the images shown here are not as good as they should be; the software is a DOS program that does not currently provide a standard image format (such as GIF or JPG) for transport into a graphics program. I have therefore had to do a screen dump resulting in a considerable loss of image quality. Additionally, there is some noise present in the raw image despite a good signal strength from my 1.8m dish. I expect to have fixed these anomalies during the next few weeks, by which time the images should be much improved.

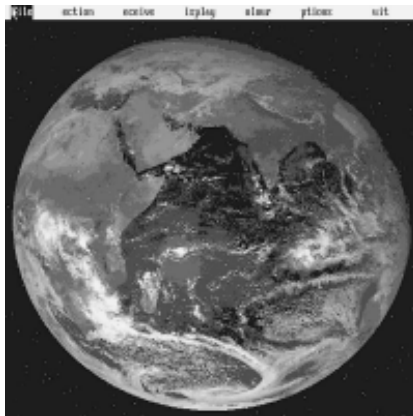


METEOSAT-7 at 0 longitude

This is the 1200 UTC native visible-light image from December 3, and is one of the very limited number of non-encrypted images. I am one of the many people who believe that all such images should be freely disseminated — but unfortunately EUMETSAT's policy involves charging a hefty fee for the decryption unit, as well as requiring the additional purchase of an interface for the unit to work with proprietary hardware. Maybe if my sister wins the lottery?

METEOSAT-5 at 63 east longitude

This is the imaging satellite used in the INDOEX (Indian Ocean Experiment), images from which are also disseminated by METEOSAT-7 at better than hourly intervals. Three spectral bands are provided, all unencrypted. Image detail in my originals is considerably better than that obtained from format conversion. However, our editorial

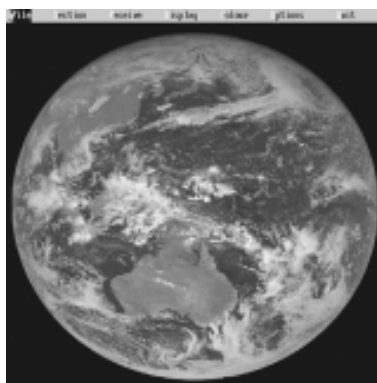


staff would be unable to display a proprietary "mpg" format image!

GMS-5 at 140 east longitude

One of the first full-disc, visible-light images that "knocked me for six" was this image showing Australia in full sunlight. Seeing the whole continent, as well as the islands of Indonesia and the Far East, was most pleasing. This November image remains my best for that region.

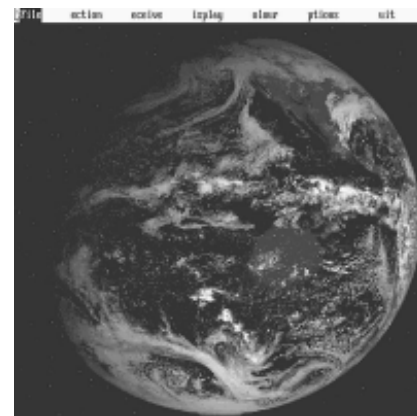
Current images of the Asian-Pacific region are available from the GMS-5 WXSAT and placed on the Internet from where they can be accessed from: <http://rsd.gsfc.nasa.gov/goesg/earth/Weather/main.html>



GOES-E and GOES-W at 75 and 135 longitude

The best visible-light images from the GOES constellation are received late in the day local time in Britain. Due to my own currently unidentified equipment problems I have not yet obtained a complete sequence of GOES images. GOES-W (currently GOES-10) provides an almost complete panorama of the Pacific Ocean, and an infrared image from both satellites is transmitted from Meteosat-7 every three hours — supplemented by a visible-light image when available.

For the latest images via the Internet, visit:



<http://rsd.gsfc.nasa.gov/goesg/earth/Weather/main.html>

For recent GOES news visit:

<http://rsd.gsfc.nasa.gov/goes/text/geonews.html>

■ Correspondence

I have received e-mails from several readers, but unfortunately my replies have bounced. Using false return addresses (to avoid spam) does mean that correspondence cannot be sent. One e-mail asked about "Thailand's weather satellite," and enquired whether any images would be available from the Internet.

I expect that "John" is referring to TMSAT — the first Thai microsat. Although it is not a weather satellite (because these transmit images in a specific format for reception on standard equipment), some images are being transmitted and placed on the Internet. TMSAT home page:

<http://www.ee.surrey.ac.uk/CSER/UOSAT/missions/tmsat/index.html>

<http://www.ee.surrey.ac.uk/EE/CSER/UOSAT/amateur/tmsat/index.html>

The TMSAT downlink is on 436.925 MHz and is presently transmitting at 9600 baud FSK. This compares with the 137 MHz WXSAT band used for APT, 1700 MHz band used for HRPT and 1691 MHz used for Primary Data. Thailand is one of the locations specifically listed, and images from all three wavebands (visible, infra-red and near-infra-red) are available.

FREQUENCIES

NOAA-14 transmits APT on 137.62 MHz
NOAA-12 and -15 transmit APT on 137.50 MHz
NOAAs transmit beacon data on 137.77 or 136.77 MHz
METEOR 3-5 transmits APT on 137.85 MHz when in sunlight
OKEAN-4 and SICH-1 sometimes transmit APT briefly on 137.40 MHz
GOES-8 and GOES-10 use 1691 MHz for WEFAX



Where have all the fed freqs gone?

One of the great debates that has raged on various internet newsgroups over the last couple of years is, "where have the feds gone on radio? I no longer hear my favorite agency on their old frequencies anymore."

While some of the agencies at various locations have moved to the nationwide 800 MHz Nextel system, in other locations the feds have moved to government trunking systems in the 406-420 MHz range. An agreement often made by government departments when they place these systems on the air is that they will allow other federal users to utilize their trunking system.

Now, with the introduction of the Opto-electronics Optotrakker and OptoCom receiving systems, you can follow government trunking systems in the 400 MHz range. These new receiving systems have opened up a whole world of listening possibilities for the federal monitor that wasn't available this time last year. Check Opto ads and your latest Grove catalog for details on these new scanning systems.

The frequencies listed in Table 1 have been allocated for government trunking systems in the 406-420 MHz band. While some agencies have been allowed to deviate from these standard plans, Table 1 represents a good starting point for radio hobbyists to start looking for government trunking systems in their area.

TABLE 1: STANDARD FEDERAL TRUNKED LAND MOBILE SYSTEMS

Group 1	
406.350	415.150
407.150	415.950
407.950	416.750
408.750	417.550
409.550	418.350

Group 2	
406.750	414.750
407.550	415.550
408.350	416.350
409.150	417.150
409.950	417.950

Group 3	
406.550	415.350
407.350	416.150
408.150	416.950
408.950	417.750
409.750	418.550

Group 4	
406.950	414.950
407.750	415.750
408.550	416.550
409.350	417.350
410.150	418.150

A Neat Fed Freq

After seeing several reports about 120.375 MHz over the years, I finally put this civilian aero frequency in one of my scanners and discovered this is one "neat freq"! It would appear, based on what I have seen and heard, that this frequency is a nationwide Justice Department frequency for air-to-ground/air-to-air operations.

If you have an extra channel in your scanner, plug in 120.375 and let it run for a while. You might be pleasantly surprised, as I was, by what you can hear on it.

Other Nationwide Government Allocations

Most scanner listeners learn early in their listening careers about civilian itinerant frequencies such as 151.625, 154.570 and 154.600 MHz. Itinerant frequencies are set aside for those businesses that would have a problem licensing a permanent base station at a particular geographic location (i.e., construction crews, NASCAR race teams and others that move around the country). These catch-all frequencies are fun to monitor and you just never know what is going to pop up on such simplex channels. But, did you know that the Feds also have some itinerant channels like their civilian counterparts?

In the VHF low band, 27.575 and 27.585 MHz are allocated for miscellaneous government short-distance low-power radio communications, radio signaling, and the control of remote objects and devices. These frequencies are not dedicated to any particular government agency, but like their civilian counterparts are shared by all the various U.S. government agencies.

The frequencies 163.100, 418.050 and 418.575 MHz are allotted for use by all U.S. government agencies and were created to satisfy intermittent wide area requirements of a transient nature.

Finally, 168.350, 408.400 and 418.075 MHz are common-use U.S. Government frequencies. These frequencies were created to provide for communications that do not justify

the assigning of a radio frequency for a particular use.

If you have some vacant memory channels in your scanner, these frequencies should be programmed and monitored for occasional activity in your area.

Hillsborough/Pinellas County Activity

One of our regular Florida reporters (Mr. Sunshine) checks in with the following fed activity report heard in the Hillsborough/Pinellas County area:

163.9625	FBI: Simplex and repeater activity with 167.900 Hz PL. Most of the traffic encrypted.
164.9875	Open key in passing vehicle, no private line (PL) tones detected. [Next time check 165.7875-Secret Service Baker for the repeater output signal. This is reported to be the input in the Tampa Bay area-Larry]
165.2375	U.S. Customs: Lima 47 (aircraft) talking with Sector (not heard) regarding travel from Corpus Christi, Texas, to Jacksonville, Florida, and getting their radio re-keyed over-the-air.
165.7875	Secret Service: Simplex activity with 103.5 Hz PL. [See 164.9875 above-Larry]
165.9750	US Customs: Mobile unit running a plate with Sector (not heard). Previous activity here with Coast Guard Station Sand Key, Florida. [This has been widely reported as the repeater input to 164.775 for a number of years now. The usage for this pair appears to be the Customs/Florida-Joint Marine Interdiction/Blue Lightning Operations-Larry]
167.4375	FBI: Simplex and repeater activity with 167.900 Hz PL. Most of the traffic encrypted.
167.5875	FBI: Simplex and repeater activity with 167.900 Hz PL. Most of the traffic encrypted.
167.6875	FBI: Simplex and repeater activity with 167.900 Hz PL. Most of the traffic encrypted.
168.8500	Repeater active with 151.400 Hz PL. [The only thing I show in my records for Florida is some INS activity in the middle portion of the state, but this was the repeater input to 170.675. Not sure what you had here-Larry]
418.2250	IRS Criminal Investigation Division: (123.0 Hz PL) Over the Air Re-keying noted. [It has been reported that in Florida this is the repeater out/simplex talk-around of this IRS allocation, repeater in 414.700 MHz-Larry]

MT's Government Master File

We continue our exploration of the VHF high government frequency band, started in the December 1998 issue, by profiling the 163.0-163.9875 MHz range in Table 2. See you in two months for another edition of *The Fed Files*, but until then, good hunting.

163.0000	Air Force, Army, Bureau of Prisons, Corps of Engineers, Energy Department, FAA, FBI, Forest Service (Region 10), Health and Human Services, Labor Department, NASA, National Institutes of Health, Navy, Nuclear Regulatory Commission, Post Office, Veterans Administration
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TABLE TWO: FEDERAL FREQUENCY ALLOCATIONS: 163-163.9875 MHZ

163.0125 (No reported activity)	163.2625 (No reported activity)	splinter frequency
163.0250 Bureau of Indian Affairs (Interior), Bureau of Land Management (Interior), Bureau of Reclamation (Interior), Coast Guard (5th District), Corps of Engineers, Energy Department, FBI, General Services Administration, Geological Survey (Interior), Interior Department (Nationwide), NASA, National Park Service, Post Office, Veterans Administration	163.2750 Air Force, Energy Department, Environmental Research Lab, National Weather Service	163.6125 Low power, non-voice up to 11 kHz bandwidth splinter frequency (after January 1, 2005)
163.0375 Interior Department (Nationwide), Veterans Administration	163.2875 (No reported activity)	163.6156 Low power, non-voice 5 kHz bandwidth splinter frequency (after January 1, 2005)
163.0500 Air Force, Army, Bureau of Land Management (Interior), Bureau of Reclamation (Interior), Coast Guard (1st/7th/8th Districts), Energy Department, FBI, Forest Service (Region 4), Immigration and Naturalization Service, Interior Department (Nationwide), Mine Safety and Health (Interior), Post Office, TVA, Veterans Administration	163.3000 Air Force, FBI, Geological Survey (Nationwide), Institute for Telecommunications Science (Nationwide), National Weather Service	163.6250 Customs Service, FBI, Immigration and Naturalization Service (Nationwide), International Boundary and Water Commission
163.0625 (No reported activity)	163.3125 (No reported activity)	163.6375 (No reported activity)
163.0750 Air Force, Army, Bureau of Indian Affairs (Interior), Bureau of Land Management (Interior), Corps of Engineers, Energy Department, FBI, General Services Administration, Interior Department (Nationwide), National Institutes of Health, National Marine Fisheries Service, National Park Service, Post Office, US Marshall Service, US Fish and Wildlife Service	163.3250 Army, Corps of Engineers, Energy Department, Environmental Research Lab (Nationwide), Geological Survey, National Weather Service (Nationwide)	163.6500 Air Force, FBI, Immigration and Naturalization Service (Nationwide)
163.0875 (No reported activity)	163.3375 Interior Department (Nationwide)	163.6625 (No reported activity)
163.1000 Government Itinerant: intermittent wide area usage (nationwide)	163.3500 Geological Survey (Nationwide), National Science Foundation, National Weather Service (Nationwide)	163.6750 Customs Service, Immigration and Naturalization Service (Nationwide)
163.1125 (No reported activity)	163.3625 (No reported activity)	163.6875 (No reported activity)
163.1250 Air Force, Army, Bureau of Indian Affairs (Interior), Bureau of Land Management (Interior), Corps of Engineers, Customs Service, Energy Department, Geological Survey (Interior), Interior Department (Nationwide), IRS, National Park Service, National Science Foundation, Post Office, TVA, US Fish and Wildlife Service, Veterans Administration	163.3750 Agriculture Research Service, Air Force, Army, Coast Guard (8th District), Energy Department (Nationwide), Forest Service (Region 6), Immigration and Naturalization Service, National Institutes of Health, Navy, Nuclear Regulatory Commission, Post Office, TVA, Veterans Administration	163.7000 FBI, Immigration and Naturalization Service (Nationwide), Smithsonian Institute
163.1375 (No reported activity)	163.3875 Interior Department (Nationwide)	163.7125 (No reported activity)
163.1500 Bureau of Indian Affairs (Interior), Bureau of Land Management (Interior), FBI, Immigration and Naturalization Service, Interior Department (Nationwide), National Park Service, TVA, US Fish and Wildlife Service	163.3906 Low power, non-voice 5 kHz bandwidth splinter frequency (until January 1, 2005)	163.7250 FBI, Immigration and Naturalization Service (Nationwide), National Park Service
163.1625 (No reported activity)	163.3937 Low power, non-voice 5-10 kHz bandwidth splinter frequency (until January 1, 2005)	163.7375 (No reported activity)
163.1750 Bureau of Indian Affairs (Interior), Bureau of Land Management (Interior), Bureau of Reclamation (Interior), Coast Guard (1st/11th Districts), Energy Department, FBI, Forest Service (Region 4), General Services Administration, Geological Survey (Interior), Interior Department (Nationwide), National Institutes of Health, National Park Service, Post Office, Soil Conservation Service (Agriculture), TVA, US Fish and Wildlife Service	163.3968 Low power, non-voice 5 kHz bandwidth splinter frequency	163.7500 Bureau of Land Management, Energy Department, FBI, Immigration and Naturalization Service (Nationwide), Labor Department, Navy
163.1875 (No reported activity)	163.4000 Low power, non-voice up to 11 kHz bandwidth splinter frequency (after January 1, 2005)	163.7625 (No reported activity)
163.2000 Bureau of Prisons, Energy Department, FBI, US Marshall Service (Nationwide)	163.4031 Low power, non-voice 5 kHz bandwidth splinter frequency (after January 1, 2005)	163.7750 FBI, Immigration and Naturalization Service (Nationwide)
163.2125 (No reported activity)	163.4125 Air Force (Nationwide), Army (Nationwide), Bureau of Reclamation (Interior), Coast Guard (8th District), Corps of Engineers (Nationwide)	163.7875 (No reported activity)
163.2250 Air Force, Customs Service, Energy Department, National Bureau of Standards (Commerce), National Marine Fisheries Service, National Weather Service	163.4250 Air Force, Army, Corps of Engineers	163.7906 Low power, non-voice 5 kHz bandwidth splinter frequency (until January 1, 2005)
163.2375 (No reported activity)	163.4375 Air Force (Nationwide), Army (Nationwide), Coast Guard (9th District), Corps of Engineers (Nationwide), Environmental Protection Agency (Nationwide), US Fish and Wildlife Service	163.7937 Low power, non-voice 5-10 kHz bandwidth splinter frequency (until January 1, 2005)
163.2500 Army, Center for Disease Control, National Institutes of Health, Public Safety (paging)	163.4500 (No reported activity)	163.7968 Low power, non-voice 5 kHz bandwidth splinter frequency
	163.4625 Air Force, Army, Energy Department	163.8000 Energy Department; low power, non-voice up to 11 kHz bandwidth splinter frequency (after January 1, 2005)
	163.4750 (No reported activity)	163.8031 Low power, non-voice 5 kHz bandwidth splinter frequency (after January 1, 2005)
	163.4875 Air Force, Army, National Science Foundation, Navy	163.8125 Bureau of Prisons, FBI, Energy Department, US Marshall Service (Nationwide)
	163.5000 Air Force	163.8250 Energy Department
	163.5125 Air Force, Army, Coast Guard (13th District), Navy	163.8375 Bureau of Land Management, Bureau of Reclamation, Energy Department, FBI (Nationwide), Forest Service (Region 4)
	163.5250 Air Force, Marine Corps	163.8500 (No reported activity)
	163.5375 Air Force (Nationwide), Army (Nationwide), Corps of Engineers, FEMA, Forest Service (Region 6)	163.8625 Bureau of Land Management, FBI (Nationwide), Forest Service (Region 4)
	163.5500 (No reported activity)	163.8750 (No reported activity)
	163.5625 Air Force (Nationwide), Army (Nationwide), Corps of Engineers	163.8875 Bureau of Land Management, Bureau of Reclamation, FBI (Nationwide), Forest Service (Region 4)
	163.5750 Interior Department (Nationwide), State Department	163.9000 Energy Department, FBI
	163.5875 Air Force (Nationwide), Army (Nationwide), Corps of Engineers	163.9125 Bureau of Land Management, FBI (Nationwide), Forest Service (Region 4)
	163.5968 Low power, non-voice 5 kHz bandwidth splinter frequency (after January 1, 2005)	163.9250 FBI
	163.6000 Marine Corps; low power, non-voice up to 11 kHz bandwidth splinter frequency (after January 1, 2005)	163.9375 Bureau of Land Management, FBI (Nationwide)
	163.6031 Low power, non-voice 5 kHz bandwidth splinter frequency	163.9500 (No reported activity)
	163.6062 Low power, non-voice 5-10 kHz bandwidth splinter frequency (until January 1, 2005)	163.9625 FBI (Nationwide), Immigration and Naturalization Service
	163.6093 Low power, non-voice 5 kHz bandwidth	163.9750 FBI
		163.9875 Bureau of Land Management, FBI (Nationwide)
		163.9968 Low power, non-voice 5 kHz bandwidth splinter frequency (after January 1, 2005)

Monitoring Accessories and Activities

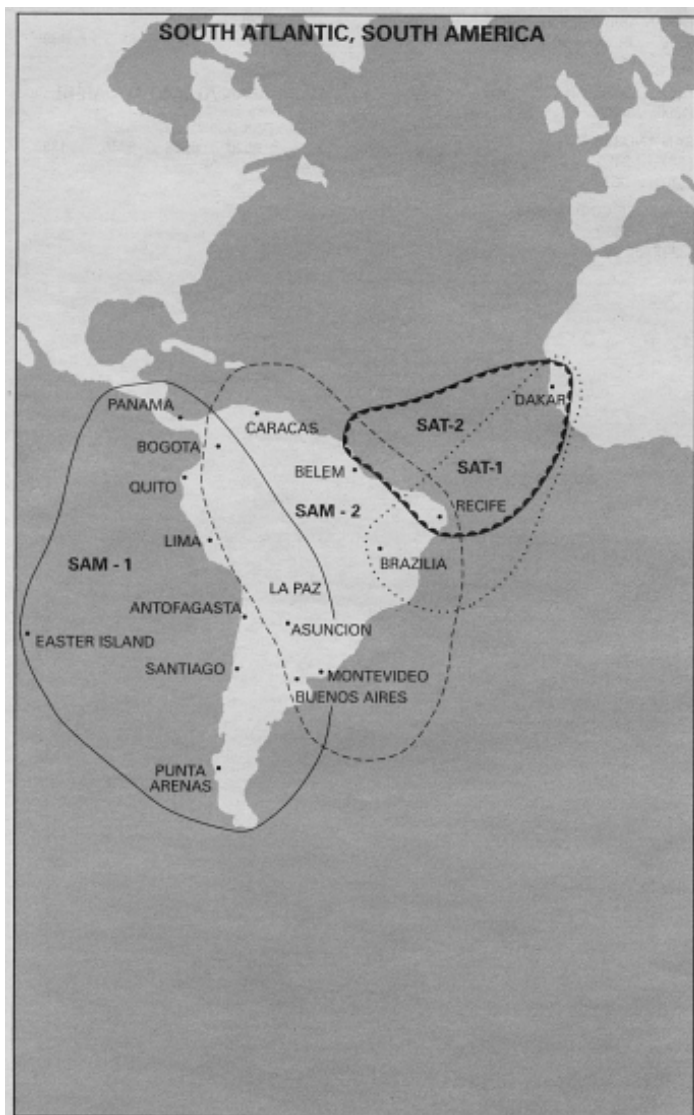
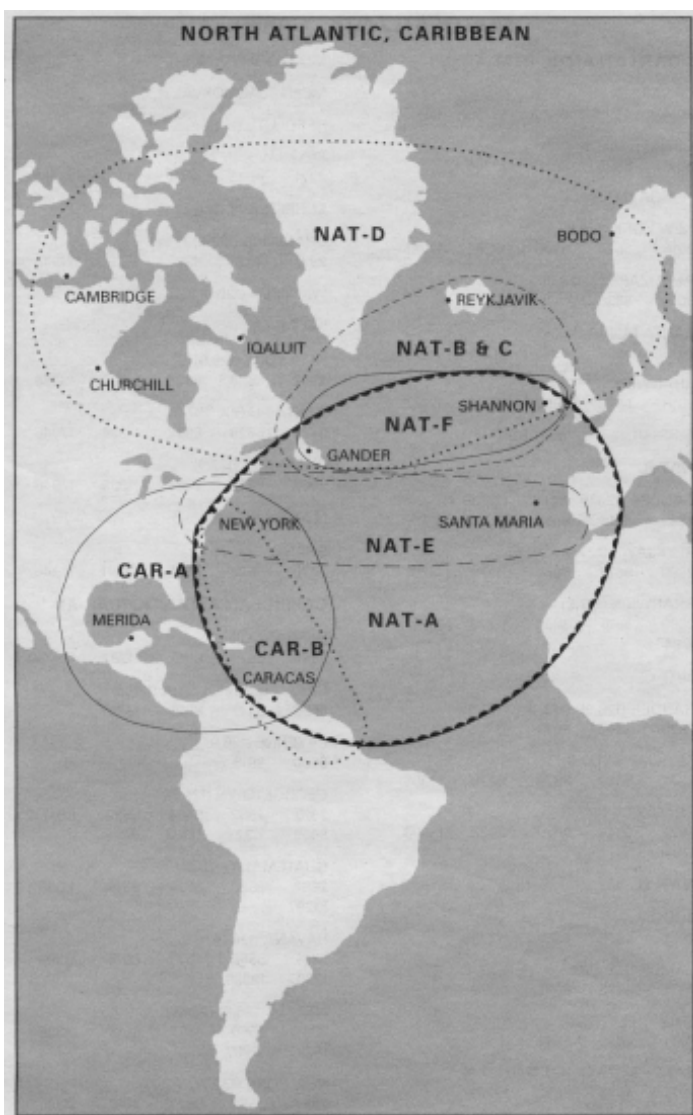
Welcome aboard, everyone! Many times over the years, we've been asked what else can an aero communications monitor do to add some depth to the hobby, instead of just sitting on one's duff and listening. So today we are going to discuss some of the different things you can do to help make your monitoring activities more interesting and fun. Also, we will finish up our listing of Major World Air Route Area control station frequencies.

For starters, maps, charts, and other guides can lend a new depth to your monitoring. How? Well, for instance, a diagram of your nearest airport can help you follow a taxiing aircraft's progress while you listen to the pilot talking to ground control. These diagrams also list frequencies for the ATIS, tower, ground control and clearance delivery. Or look at an area arrival chart of your locale while the flight you're monitoring is making an approach.

Enroute low and high altitude charts

make following a flight across the country more realistic. You can find arrival charts, airport diagrams, and other related maps and charts at your local airport's fixed base operator (i.e. AMR Combs, etc.).

Two other excellent sources for charts and related publications are the NOAA Distribution Division, 6501 Lafayette Avenue, Riverdale, MD 20737-1199, and the Defense Mapping Agency Aerospace Center, 3200 South Second Street, St. Louis, MO 63118-3399.



■ Visit a Facility!

If you live within a reasonable distance from an airport with a Control Tower, an Air Traffic Control Center, or Flight Service Station, call the facility's Air Traffic Manager and ask for a tour. It's good public relations for them and lets us see what we've been hearing.

Just explain that you're an aviation comms monitor and you'd be interested to see what controllers actually do. Most installations' Air Traffic Managers are extremely helpful and more than pleased to arrange a tour. Also ask if they would let you have a frequency chart of their control area to follow at home.

■ Utilize Your Computer!

If you're an aero comms monitor with a PC, you can fulfill that "yen" to fly a 747, an F-14, a Zero, or how about a 737? Maybe a Sopwith Camel would be interesting to try. In addition to flying the big and little birds, with the magic of your PC, you can also be an Air Traffic Controller. Most of these programs are *not* games, but are very realistic simulations made to give you the feeling of being in the left seat of an airliner or controlling a sky full of planes.

With all of the above suggestions, monitoring can take on a new and interesting adventure for you. Try some of them!

.....

■ New World MWARAs

This month we finish up our profile of major world air route area control stations in North and South America. Our map source is a recent Department of Defense publication. All frequencies are kHz.

NAT-A (North Atlantic-A): Canarias, Gander, New York, Piarco, Paramaribo, Santa Maria, Shanwick; 3016, 5598, 8906, 13306, 17946.

NAT-B (North Atlantic-B): Gander, New York, Reykjavic (Callsign-Iceland), Shanwick; 2899, 5616, 8864, 13291, 17946.

NAT-C (North Atlantic-C): Gander, Reykjavic, Shanwick; 2862, 5649, 8879, 11306, 17946.

NAT-D (North Atlantic-D): Bodo, Cambridge Bay, Churchill, Iqaluit (Frobisher Bay), Gander, Reykjavik, Sondrestrom;

2971, 4675, 8891, 11279, 13291, 17946.

NAT-E (North Atlantic-E): New York, Santa Maria; 2962, 6628, 8825, 11309, 13354.

NAT-F (North Atlantic-F): Gander, Shanwick; 3476, 6622, 8831, 11336, 13291.

SAT 1/2 (South Atlantic 1/2): Brasilia, Canarias, Cayenne, Dakar, Las Palmas, Manaus, Paramaribo, Recife, Rio de Janeiro, Sal Island, Salvador (Dois de Julho); 2854, 3452, 5565, 6535, 8861, 11291, 13315, 13357, 17955.

CAR-A & B (Caribbean Area A & B): Barranquilla, Boyeros, Caracas, Cayenne, Curacao, Georgetown, Guatemala City, Havana, Kingston, Maiquetia, Merida, New York, Panama, Paramaribo, Piarco, San Andres Island, Santiago De Cuba, San Jose, Santo Domingo, Tegucigalpa (Toncontin Int'l); 2887, 3455, 5550, 5520, 6577, 6586, 8846, 8918, 8846, 11330, 11396, 13297, 17907.

SAM-C (South America Central Area): Belem, Bogota, Brasilia, Iquitos, Leticia, Manaus, Maiquetia, Porto Velho, Rio de Janeiro; 3479, 5526, 8855, 10096, 13297, 17907.

SAM-NE (South America North Eastern Area) Belem, Cayenne, Georgetown, Maiquetia, Paramaribo, Piarco, Recife; 3479, 5526, 8855, 10096, 13297, 17907.

SAM-NW (South America North Western Area): Barranquilla, Bogota, Caracas (Maiquetia), Lima, Quito; 2944, 4669, 6549, 10024, 11360, 17907.

SAM-SE (South America South Eastern Area): Asuncion, Belem, Brasilia, Buenos Aires, Campo Grande, Curitiba, La Paz, Montevideo, Lima, Porto Alegre, Porto Velho, Recife, Resistencia, Salvador (Dois De Julho), Santa Cruz; 3479, 5526, 8855, 10096, 13297, 17907.

SAM-SW (South America South Western Area): Antofagasta, Asuncion, Bariloche, Buenos Aires (Ezeiza), Comodoro Rivadavia, Cordoba, Easter Island (Pascua), La Paz, Lima, Mendoza, Puerto Montt, Punta Arenas, Resistencia, Salta, Santa Cruz (El Trompillo), Santiago, Talara, Ushuaia; 2944, 4669, 6549, 10024, 11360, 17907.

That's all for this month. See you in March with more aero comms news and views.

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DXing on the Road

I've just returned from a week-long vacation trip to see the desert country in West Texas and New Mexico. The scenery certainly didn't disappoint me: The Guadalupe Mountains about 100 miles east of El Paso are a natural treasure! A vacation trip is also an excellent chance to do some interesting DXing.

If you travel by road like I do, you're bringing a pretty good piece of DX equipment with you — your car radio. When traveling in the West, you'll find large areas with few or no local stations, places where everything on the dial is DX. Travel in border areas gives you an opportunity to hear Mexican or Canadian stations at local strength and to become familiar with the behavior of these stations that may be DX targets at your home. And wherever you go, local radio can give you a taste of local flavor that may be missed in the tourist areas you visit.

On FM, the isolated roads of the rural West and Plains can be a good place to listen for meteor bursts. Tune to a place between local signals and just listen to the hiss. Eventually, you're likely to hear brief bursts of music and/or talk. These are the signals of stations 500-1200 miles away, bouncing off the ionized trails left by vaporizing meteors. If you're really lucky, you might actually hear something that allows you to identify the station you heard. On my trip to the WTFDA (Worldwide TV-FM DX Association) convention a few years back, I identified KZZZ-FM in Arizona, KWWK-FM in Minnesota, and WYNU-FM in Tennessee, all on the car radio while driving near Garden City, Kansas.

If the purpose of your trip is sightseeing, you probably don't have much to do between dinner and bedtime. I usually take a ride through the center of the city I'm staying in — but in a small town like Plainview, Texas, or Clarksville, Arkansas, that doesn't take very long. So I bring along a small portable (in my case a Sony ICF-2010) and do some DXing from my motel room. On the road, a receiver with an accurate digital dial is important, as you don't know what frequencies the locals and strong regular DX will be on. I scan the band from 530 to 1700, taking a quick note of the strength and programming on each frequency. I then go back and try to identify as many of these stations as possible.

Some interesting patterns emerge. For example, WSM-650 is strong throughout almost all of Texas at night — but disappears under Mexican interference as soon as you enter New



WJNZ-1680 are the new calls for the urban contemporary station near Grand Rapids, Michigan. It was formerly known as WBHD and is the expanded-band station for WMHG-1600 Muskegon.

Mexico. KMBZ-980 Kansas City is strong nighttime reception throughout this area, though I've only heard it once at home in Nashville. And in Albuquerque, Los Angeles stations KFI-640, KFWB-980, and KNX-1070 are all quite strong at night; while KNX is heard well elsewhere in Texas, KFI is usually very weak elsewhere. This is the first time I've ever heard KFWB from outside California.

Expanded Band News

Things continue to happen fast on the expanded AM band. Probably the biggest news is the appearance of KKWY-1630 in Cheyenne. KTWO-1030 Casper is an easy catch in much of the West, but for those of us who DX from east of the Mississippi, Wyoming is a very tough state. KKWY should make it somewhat easier (if we can work around KCJJ's massive signal from Iowa!). WHLY-1620 South Bend, Indiana, is associated with WJVA-1580 and airs middle-of-the-road and nostalgia music. And KCNZ-1650 is a talk station in Iowa Falls (Waterloo), Iowa. There are some reports that KSMH-1620 Auburn (Sacramento), California, will be on shortly; this station is expected to air Catholic programming. With the speed at which things are happening above 1600 kHz, you should check the dial regularly. You might be the first to catch a new station and a rare state!

Bits and Pieces

As I noted last month, the CBC AM stations in Montreal and Toronto survived their planned shutdown on October 20 of last year. I am now hearing that 740 in Toronto could remain on as late as November of this year — FM coverage has not been as good as hoped. As I write, the Montreal stations are still operating, too, though

I haven't heard any reason for that. Also in Canada, the digital radio transmitters for Montreal have been approved. However, I have yet to receive any reports of any of these digital stations actually beginning operation.

Robert Brock forwarded his expanded-band loggings from Phoenix. KXOL-1660 Brigham City, Utah, (with IDs for their sister station KSOS-800) has been quite clear in Arizona. Robert used to receive KAYK-1690 Aurora (Denver), Colorado, with Radio Disney, but it's disappeared from his dial. (I finally heard KAYK for the first time here in Tennessee last week...) KKTR-1650 Costa Mesa (Los Angeles), California, is in at times.

Robert is also hearing a traveler's-information station ("TIS") on 1610 kHz. Bill Harms' excellent TIS database (www.erols.com/wharms/tis) indicates this is the City of Phoenix's WXX790.

How's DX in your town? Write Box 98, Brasstown NC 28902-0098, or by email to w9wi@bellsouth.net. Good DX!

EXPANDED-BAND SCORECARD

The following stations were operating in the expanded band as of late 1998:

Frequency	Call	City	Programming
1620	WPHG	Atmore, AL	religion
1620	WJVA	South Bend, IN	nostalgia/ m.o.r.* music
1620	KYIZ	Renton (Seattle), WA	urban contemporary
1630	KCJJ	Iowa City, IA	rock
1630	KKWY	Cheyenne, WY	oldies
1640	KDIA	Vallejo (S.F.), CA	soul oldies
1640	KKJY	Lake Oswego, OR	religion
1640	WKSH	Sussex (Milw.), WI	religion
1650	KKTR	Costa Mesa (LA), CA	traffic reports
1650	KCNZ	Cedar Falls, IA	talk
1660	WQSN	Kalamazoo, MI	sports talk
1660	WBAH	Elizabeth (NYC), NJ	Spanish talk
1660	KXOL	Brigham City, UT	oldies
1670	WNML	Warner Robins, GA	sports talk
1670	WTDY	Madison, WI	talk
1680	WJNZ	Ada, MI	urban contemporary
1690	KAYK	Arvada (Denver), CO	"R. Disney" for kids
1690	WMDM	Lexington Park, MD	talk
1700	WCMQ	Miami Springs, FL	Spanish music & talk
1700	KBGG	Des Moines, IA	business news & talk
1700	KTBK	Denison-Sherman, TX	has tested with oldies but is not operating regularly.

* middle of the road

Shortwave Pirate Broadcasts Adjust to FCC Busts

The North American shortwave free radio scene is still buzzing over four pirate busts executed over Halloween weekend in the United States. As of press time for this month's issue of *MT*, we have no additional information on the four stations busted. As we reported last month, the FCC announced enforcement actions against pirates on 6955 kHz in Massachusetts, Illinois, Texas, and California. The FCC took no additional action for at least six weeks after these visits to alleged transmitter sites.

Fed by news over the internet, word of the busts spread like lightning through the pirate broadcasting community. Initially the volume of pirate activity plunged toward zero. But, as we see this month, our readers have noticed many stations maintaining a presence on the pirate bands, even after the bust scare. Most stations have reduced their broadcasting duration to about 15-20 minutes instead of the former 45-60 minute norm. Random, unpredictable, and relatively short transmissions are considerably more difficult for the FCC to enforce, so revised tactics can be anticipated from unlicensed broadcasters for a while.

■ Radio Cochiquaz

Various South American pirate stations remain outside the jurisdiction of the USA FCC. During late 1998 *MT* received a surprising number of North American logs for a variety of South American free radio stations. An excellent place to go for information on several active stations is the web site for **Andino Relay Service, Radio Cochiquaz, Radio Piraña International, Radio Blandengue, and Radio Zamba**. Point your internet browser to <http://www.geocities.com/Area51/Shadowlands/4401/index.html> for the latest information. Reception reports with two IRC's return postage for Cochiquaz go to Casilla 2571, 1000 Buenos Aires, Argentina. The Merlin Canadian maildrop (see below) works for Blandengue.

Loggings indicate that the stations typically use lower sideband modulation on frequencies such as 6880, 6970, and 6980 kHz. Propagation is best for about an hour before and after your local sunset, with activity normally noted at least two or three weekends per month. These stations are tough DX, but they are audible with persistence. Good luck!



South American pirates using 6980 kHz LSB.

■ Stoneham Maildrop Closing

In the December issue of *The ACE*, still the leading shortwave pirate loggings bulletin in North America, John T. Arthur's *Directory* announced that the Stoneham, MA, pirate maildrop would be closing, effective January 1, 1999. *MT* has confirmed this. But, the Stoneham coordinator indicates that mail should continue to be forwarded for at least through the winter of 1999. Stations using the service should look for a new address.

■ Shortwave Pirate Activity

Unless indicated otherwise, pirate radio stations heard by our readers last month all used frequencies within 500 kHz of 6955 kHz, typically from two hours before sunset until at least 0500 UTC. Morning and afternoon broadcasts increase on the weekends. Programming formats and contact maildrops (when known) are listed here.

Blind Faith Radio- Dr. Napalm's classic rock station verifies with no return postage required. (Merlin)

Deliverance Radio- Their format is endless "dueling banjos" music. (None)

He Man Radio- Using upper sideband, "the manliest of all modes," He Man plays rock and promotes pirate radio, selling T-shirts for \$12 via BRS. (Blue Ridge Summit)

KAVL- Although not heard yet, Joe Smith of "America's Voice of Liberty" tells *MT* that he will feature music and current event commentaries. (None so far)

K-Mart Radio- "Stone Cold" programs mostly rock oldies. (None; requests reports to the FRN Grapevine or ACE logs web sites)

Radio Chad- Definitely not the international broadcaster, this one plays hard rock music. (None)

Radio Free Speech- Bill O. Rights has been attacking the FCC, which he says is behaving in violation of the USA Constitution. (Belfast, revised QSL policy unknown)

Radio Metallica Worldwide- Dr. Tornado and Señor El Niño's 15 kilowatt pirate powerhouse has been operating on 7415 kHz when WBCQ and the **Voice of America Botswana Relay** are not on the

channel. (Blue Ridge Summit)

Radio Voice of Trailer Park Ministries- Last heard in 1990, Rev. R. F. Fields has returned with his preaching and gospel music. Nine years ago he claimed to be the first religious shortwave pirate. (None)

Radio Xanax- "The Relaxation Station" is primarily a music programmer, but high-pitched announcers' voices also plug calm personalities. (Stoneham)

Rubber Duck Radio- Except for audible tests, not much is known about this new one. (None)

SWRS- It's still the best heard Europirate in North America. Check 21450 7590, 11470, and 21450 kHz for them. (Basel)

Voice of the Pig's Ear- Direct from the station, they say that they will use a maildrop, but it's unclear if the FCC busts will impact potential QSLs. (Providence explored but not confirmed)

WACK- They still broadcast rock music and commentaries. Station bumper stickers have been arriving for phoned reception reports. (Use toll-free 800 number announced during shows)

WBIG- Big Mike, with cameo appearances from Phil Muzik at **KNBS**, produces rock music programming. (Belfast)

WJFK- The Kennedy memorial station once again transmitted on November 22, which they try annually. (None; verifies logs in *The ACE* and *Free Radio Weekly*)

Reception reports to pirate stations require 3 first class stamps for USA maildrops or \$2 US to foreign addresses. Send your letters to PO Box 1, Belfast, NY 14711; PO Box 28413, Providence, RI 02908; PO Box 109, Blue Ridge Summit, PA 17214; PO Box 146, Stoneham, MA 02180; PO Box 293, Merlin, Ontario N0P 1W0; and PO Box 510, 4010 Basel, Switzerland. When addresses are unknown, internet postings on alt.radio.pirate or the Free Radio Network web site at <http://www.frn.net/> occasionally work.

■ Thanks!

Your input is always welcome via PO Box 98, Brasstown, NC 28902, or via the e-mail address atop the column. We appreciate material sent in this month by Shawn Axelrod, Winnipeg, Manitoba; Radio Bob, Lula, GA; Ranier Brandt, Hoefer, Germany; Chris and Lucy, Crete; Jerry Coatsworth, Merlin, Ontario; Ross Comeau, Andover, MA; Tim Cooper, UK; Joe Filipkowski, Providence, RI; Paul Griffin, San Francisco, CA; William Hassig, Mt. Prospect, IL; Peter (not Paul!) Lautzenheiser, Wooster, OH; Zacharias Liangas, Italy; Chris Lobdell, Stoneham, MA; Gigi Lytle, Lubbock, TX; Greg Majewski, Oakdale, CT; Armando Mastrapa, Miami, FL; Pat Murphy, Norfolk, VA; Dr. Napalm, Merlin, Ontario; Dick Pearce, Brattleboro, VT; Mike Prindle, New Suffolk, NY; Al Quagliari, Albany, NY; Jesse Rose, Hampton, VA; Martin Schoech, Merseburg, Germany; Ken Simon, West Palm Beach, FL; Lee Silvi, Mentor, OH; DJ Stevie, Basel, Switzerland; Niel Wolfish, Toronto, Ontario; and David Zantow, Janesville, WI.

Lowfer Update

February is one of the best times of the year to DX experimental "lowfer" stations. LF signals are often enhanced in the winter, and the natural static levels are practically nil in most parts of the country.

Thanks to our friends at the Longwave Club of America (LWCA), we have a list of Lowfers believed to be active at this writing (see Table 1). The list comes from the *Lowdown*, the official journal of the LWCA. (For subscription information, write to LWCA headquarters at: 45 Wildflower Rd., Levittown, PA 19057-3209.)

For those not familiar with the U.S. lowfer (low frequency experimenter) band, it comprises a sliver of spectrum from 160 to 190 kHz where license-free operation is permitted using no more than 1 watt and a 15 meter (50 foot) antenna. Any mode (other than spark transmission) is allowed.

TABLE 1. LOWFER LISTINGS—WINTER '98

FREQ.	ID	CITY
174.600	8TXT	SANDUSKY, OH
175.000	D	DES MOINES, IA
178.500	X	WHEATLAND, WY
178.600	ZWI	BALDWINVILLE, NY
179.860	FL	SILVER SPRING, MD
180.000	G	PALO ALTO, CA
180.000	K3DI	ARNOLD, MD
181.167	IZG	SAN GABRIEL, CA
181.620	RL	HERNDON, VA
182.250	BRO	DULUTH, MN
182.500	UD	WAKEFIELD, QC
182.518	NR	RIVERSIDE, CA
182.660	A30	MONROEVILLE, PA
182.700	TFQ	CENTERTOWN, KY
183.160	PRK	SARATOGA, CA
183.500	ELU	SIMI VALLEY, CA
183.500	PLI	BURBANK, CA
183.500	Z	LAYTON, UT
184.320	IA	MARION, IN
184.320	YWK	DALLAS, GA
184.877	R	DURANT, OK
185.000	RED	WAUSA, FL
185.900	3SCO	SCARBOROUGH, ON
186.000	GW	ATHENS, OH
186.320	P	CORNISH, NH
186.375	BA	LANCASTER, IL
186.750	LEK	AITKIN, MN
186.800	MS	SCOTTSBURG, IN
186.890	VPMO	VALLEY PARK, MO
186.986	BOB	MAHOMET, IL
187.088	M	BRAWLEY, CA
187.370	HM	PRESCOTT, AZ
187.460	BK	SHELL LAKE, WI
187.470	JMN	ARDEN, SC
187.500	K	OAK RIDGE, TN
187.500	WA	ANDOVER, MA
187.500	YD	WHITE CITY, FL
187.650	HDO	MORRO BAY, CA
187.780	MOO	MONROEVILLE, NJ
187.800	VA	SMITH MTN. LAKE, VA
188.150	YHO	MASON, OH
188.780	IMG	CRYSTAL, MN
188.810	R	DURANT, OK
188.920	DJL	NEWBURY PARK, CA

189.190	SAM	CRYSTAL, MN
189.200	GIR	NEW EAGLE, PA
189.360	TH	COLTS NECK, NJ
189.800	RM	DULUTH, MN
189.900	TEXAS	HASLET, TX
189.950	OK	DAVENPORT, OK

Loggings

This month's loggings are from Dick Pearce (VT) and MT's own Jacques d'Avignon (ON). You'll note that not all of these loggings are for beacons. The list also contains many utility signals heard below 190 kHz. I'd like to know what you've been hearing lately. Send your loggings to: *Below 500 kHz*, P.O. Box 98, Brasstown, NC 28902.

FREQ.	ID	LOCATION	BY
11.7	ALPHA System	Russia	J.D. (ON)
12.7	ALPHA System	Russia	J.D. (ON)
23.4	NPM	Pearl Harbor, HI	J.D. (ON)
24	NAA	Cutler, ME	J.D. (ON)
24.8	NLK	Jim Creek, WA	J.D. (ON)
57.8	Unknown CW	??	J.D. (ON)
60	WWVB	Ft. Collins, CO	J.D. (ON)
73.6	CFH	Halifax, NS	J.D. (ON)
122.5	CFH	Halifax, NS	J.D. (ON)
189	LW Bst.	Iceland	J.D. (ON)
194	TUK	Nantucket, MA	J.D. (ON)
198	DIW	Dixon NC	J.D. (ON)
220	BX	Blanc Sablon, QC	J.D. (ON)
257	GTB	Fort Drum, NY	J.D. (ON)
278	MG	Matagami, QC	J.D. (ON)
289	YLQ	La Tuque, QC	J.D. (ON)
303	YPP	Parent, QC	J.D. (ON)
317	R	Trenton, ON	J.D. (ON)
330	BG	Binghampton, NY	D.P. (VT)
338	DE	Detroit, MI	D.P. (VT)
353	CGE	Cambridge, MD	D.P. (VT)
353	FOA	Elm River, IL	D.P. (VT)
356	YZD	Toronto, ON	D.P. (VT)
366	MW	Maniwaki, QC	J.D. (ON)
371	AZ	Austin, TX	D.P. (VT)
382	LQ	Boston, MA	J.D. (ON)
382	UPA	Punta Alegre, Cuba	D.P. (VT)
388	RNW	Washington, NC	D.P. (VT)
391	DDP	San Juan, PR	D.P. (VT)
410	JU	West Jefferson, NC	D.P. (VT)
420	CFY	Lake City, SC	D.P. (VT)
421	EF	McKinney, TX	D.P. (VT)
423	CKP	Pilot Rock, IA	D.P. (VT)
510	OF	Norfolk, NE	D.P. (VT)
512	HMY	Lexington, OK	D.P. (VT)
518	GCT	Guthrie Center, IA	D.P. (VT)
521	GM	Greenville, SC	D.P. (VT)
521	TVX	Greencastle, IN	D.P. (VT)
524	UOC	Iowa City, IA	D.P. (VT)
524	AJG	Mt. Carmel, IL	D.P. (VT)
526	ZLS	Stella Maris, BAH	D.P. (VT)

GWEN Gone

On November 1st 1998, the raspy bursts of the Ground Wave Emergency Network (GWEN) became history. This 150-175 kHz U.S. Air Force "doomsday" system first appeared in the '80s and was intended to keep communications open during a nuclear attack. Many of these stations will be retrofitted for Differential GPS (DGPS) service on the old marine band (285-325 kHz).

LF Ham Band Coming?

The ARRL has submitted a formal petition to the FCC requesting two LF ham band allocations — one at 136 kHz and another at 160-190 kHz. The petition requests a maximum allowable transmitter power of 200 watts, and an Effective Isotropic Radiated Power (EIRP) from the antenna of 2 watts. (The efficiency of most LF transmitting antennas is less than 1 percent, so it's unlikely that most hams will ever approach 2 watts of EIRP.)

Can you help?

At one time or another, most of us have sold some piece of radio gear only to regret it later. On two previous occasions, *Below 500 kHz* readers have come to the rescue of fellow readers by helping them relocate equipment that they once owned. I've received just such a request from Dave Hallidy, K2DH (ex-KD5RO).

The story goes back to Christmas morning in 1964, when Dave woke to find a brand new Hallicrafters S-118 receiver under the tree. It was a present from his Dad. Dave heard his first DX with this receiver, as well as dozens of longwave beacons. The set also served as his first ham receiver when he became a licensed amateur, and brought in trans-oceanic DX on frequencies as high as 15 meters. (No small feat for an entry-level rig!)

Over the years, Dave pursued many other interests in ham radio, including moonbounce and record-setting work in the microwave region of the spectrum. Despite these achievements, he has never forgotten the little receiver that made it all possible (pictured below).

Dave would like to hear from any readers that might know where he could find another S-118. If you have any information, please drop me a note and I'll pass it along to him.



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Protection against Cellular Fraud

The nature of fraud in cellular telephone systems is changing as service providers incorporate new defenses. Three years ago the industry reported fraud losses of \$800 million due primarily to the use of "cloned" cell phones (see *PCSFront Line*, January 1997). In 1998 those losses dropped to less than \$300 million as two anti-fraud technologies, authentication and radio frequency fingerprinting, came into widespread use.

■ Authentication

Authentication uses a cryptographic process to determine whether a cellular telephone is legitimate or not. Before the phone is activated it is programmed with a secret number called an *A-key*, a copy of which is also stored in the cellular service provider's computer. The *A-key* is used by the phone and the service provider to generate Shared Secret Data (SSD).

When a phone attempts to place a call, the service provider issues a mathematical challenge to the phone. The phone uses the SSD to compute a response, which it sends back. The service provider checks this response using a local copy of the SSD, and if the two answers match the phone is allowed to place the call. Cloned phones will presumably not have the correct SSD and will fail the challenge-response process.

In 1996, 21 of the 100 top cellular markets had authentication, and only a handful of cellular telephones were capable of performing the process. Today, two-thirds of the top 100 markets have authentication in place and the majority of new phones are authentication-capable.

Interestingly enough, almost no PCS providers are using authentication. There are also other hurdles. Certain safety features of the authentication process are not used, and many carriers use the same *A-key* for all phones in their network.

So far none of these weaknesses have been exploited by criminals, and by and large authentication has been very successful. Roseanna DeMaria, Vice President of Business Security at AT&T Wireless, calls it "the nuclear weapon of fraud prevention."

■ Radio Frequency Fingerprinting

Just as no two human fingerprints are exactly identical, transmission characteristics vary slightly between individual cellular telephones. Such technical details as phase noise and har-

monic spectra can uniquely identify a particular cell phone transmitter. By checking this transmitter signature against a known good signature, an RF fingerprinting system can determine whether a cell phone trying to place a call is the real thing or an impostor.

In 1996, 19 of the top 100 cellular markets had installed radio frequency fingerprinting systems. Today 73 are performing fingerprinting, with increasing interest from PCS carriers and operators in other countries.

■ Wireless Telephone Protection Act

Congress listened to the wireless industry lobbyists and passed the Wireless Telephone Protection Act, signed by the President and now Public Law 105-172, making it illegal to possess, produce or sell hardware or software used for cloning a wireless telephone. This act removes the "intent to defraud" clause in the previous law, relieving prosecutors of the task of proving a defendant intended to defraud service providers.

It is now simply illegal in the United States to own certain types of hardware or software. A first offense is now punishable by 15 years in prison, and a second or subsequent offense carries a possible 20 year sentence. Besides additional fines and penalties, the Act also authorizes the government to seize any and all personal property used or intended to be used in the crime.

Although described as only related to cloning cellular telephones, the wording of the Act covers a great deal more:

18 U.S.C. 1029(a)(9) "knowingly uses, produces, traffics in, has control or custody of, or possesses hardware or software, knowing it has been configured to insert or modify telecommunication identifying information associated with or contained in a telecommunications instrument so that such instrument may be used to obtain telecommunications service without authorization."

This is broad enough to include Internet access, voicemail accounts, and many other information services carried via a telecommunications network.

Fraud is still occurring despite these technical and legislative tools, and new forms are emerging.

■ Subscription Fraud

Wireless carriers now view fraudulent

subscriptions as the biggest threat to their bottom line. Individuals with no intention of paying for service are signing up with fake identification or using the stolen credentials of others, causing a reported loss in 1998 of more than \$300 million. In response, the wireless industry is beginning to implement the safeguards that other credit-granting companies do, including checking for bad addresses, mismatched telephone numbers, and other obvious inconsistencies. Carriers are also learning the patterns of subscription fraud, including the common indicator of a billing address change within the first 15 to 30 days of opening an account.

Late in the 105th Congress, the Identity Theft and Assumption Deterrence Act was passed and is now Public Law 105-318. It specifically addresses wireless subscription fraud, but overall prohibits the unlawful possession, transfer, or use of a "means of identification" of another person. It is promoted as a tool to fight criminals that gain access to someone's credit card, Social Security number, or other identification and use it to acquire goods or services.

Occurrences of identity theft have been increasing in recent years as lax privacy standards and large computer databases make it easy to gather sensitive information about almost anyone.

■ Insider Fraud

Wireless carriers are also beginning to realize that their own employees contribute to fraudulent activity, with sales people doing everything from establishing fraudulent or fictitious accounts to activating accounts by going through the billing system. Numerous employees from a variety of cellular companies have been caught selling identification numbers or other access codes to criminal enterprises, or using their position of trust to reveal competitive information.

■ Network Intrusions

Like most modern businesses, wireless service providers rely on computers to do everything from controlling the wireless network to generating billing statements, and they are beginning to realize that their computers are not well protected. Last summer at the Black Hat Briefings (one of the premier computer security conferences held each year), information

security specialists described numerous specific, real-world attacks launched against data networks. Many of these attacks exploit weaknesses in certain operating systems and improperly configured support software commonly used by wireless service providers.

However, not all network intrusions are performed by persons with extraordinary computer skill. Such simple things as poor password selection have led to more system compromise than esoteric software bugs. For example, one study by a Black Hat participant reported that at least five percent of all administrative passwords are the word "password," with many others easily guessed. This is borne out by an admission by AT&T Wireless that all of their security breaches in the past year were due to identification/password management problems of one kind or another.

■ The Bottom Line

While it is true that fraud is costing wireless service providers money, each company has to answer the question, what's an acceptable level of fraud? Clearly it is not financially reasonable to spend more money on fighting fraud than would be lost to it otherwise, so companies must strike a balance between detecting, preventing, and prosecuting fraud and the losses they incur. With the drop in reported losses from four percent of industry revenue three years ago to less than half a percent currently, expect fraud departments to shrink and corporate resources to be spent elsewhere, at least until the next form of fraud becomes commonplace.

■ 220 MHz

For those of you still counting, the Federal Communications Commission (FCC) completed their 17th auction in October of 1998. More than 900 licenses were up for bid in the 220 MHz band, which was taken away from the Amateur Radio service a few years ago.

Three nationwide licenses, six licenses in each of five Regional Economic Area Groups, and five licenses in each of 175 Economic Areas represent "Phase II" of the licensing process for this band. Phase I occurred in 1992 and 1993 by lottery.

The 220 MHz service is divided into 200 channels of 5 kilohertz (kHz) each. Each channel is a pair of frequencies, with base stations transmitting between 220 MHz and 221 MHz, and mobile or control stations transmitting exactly one MHz higher.

Although one of the original goals of the 220 MHz service was to encourage the development of spectrally efficient technology to work in the narrow 5 kHz channels, the FCC has relented and will allow license holders of adjacent channels to combine them into wider frequency blocks.

CHANNEL ASSIGNMENTS IN THE 220 - 222 MHz BAND

Channel	Base Frequency	Mobile Frequency
1	220.0025	221.0025
2	220.0075	221.0075
3	220.0125	221.0125
...
199	220.9925	221.9925
200	220.9975	221.9975

Channels 21 through 30 and 151 to 160 were licensed in nationwide 5-channel blocks for non-Government users during Phase I. Channels 111 through 120 are nationwide 5-channel blocks for Government use.

Channels 161 through 170 and 181 through 185 were set aside during Phase II as non-nationwide channels for Government users. Ten channels (161 - 170) go to Public Safety Radio Services (PSRS) and five channels (181 - 185) are for Emergency Medical Radio Service (EMRS).

Of the PSRS channels, 161 through 165 are licensed on a shared basis to all eligible public safety agencies. These will be the common mutual aid channels that agencies will use to communicate with each other during combined operations. The other five channels (166 through 170) are for exclusive use to a single license holder.

Three licenses for 30 nationwide channels were auctioned, with SMR equipment manufacturer Intek Global winning two.

■ Nationwide Licenses

License	Channels
1	51 - 60
2	81 - 90
3	141 - 150

In an attempt to be fair to auction participants and Phase I license holders, the FCC worked out the idea of "channel groups." These groups are made up of five non-contiguous channels within the band. These groups are used in the non-nationwide licenses.

Channel Group	Channels
1	1, 31, 61, 91, and 121
2	2, 32, 62, 92, and 122
...	...
19	19, 49, 79, 109, and 139
20	20, 50, 80, 110, and 140

■ Economic Area Licenses

Five blocks of 10 channels each were auctioned for 175 geographic areas called Economic Areas (EAs). Based on work by the Department of Commerce, these EAs represent collections of counties that are tied together by business activity.

Block	Channel Groups
A	2, 13
B	3, 16
C	5, 18
D	8, 19
E	171 - 180

■ Regional licenses

Six geographic areas called Regional Economic Area Groupings (REAG) each have fifteen channels, for a total of 75 REAGs. These REAGs are simply collections of EAs, each the size of several states.

Block	Channel Groups
F	1, 6, 11
G	4, 9, 14
H	7, 12, 17
I	10, 15, 20
J	186 - 200

The auction sold 693 of the 908 available licenses, with bids totaling more than \$21 million. Each license is good for 10 years, and each winner must meet timetables for buildout of their services. These frequencies will be used by Specialized Mobile Radio (SMR) companies primarily for business use, including paging, data networking, and some digital voice services. The remaining licenses are expected to be re-auctioned in June of 1999, presuming a sufficient number of participants can be found.

That's all for this month. I welcome your electronic mail at dan@decode.com, and a variety of technical information is available on my website at <http://www.decode.com>. Until next time, happy monitoring!

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Data Decoder Interface for Trunk Following

The only certainties today are death, taxes, and change. I can't handle the first two, but I have a change for you, if the idea of automated trunk following¹ appeals. I don't use real TrunkTrackers®, so alternative ways to follow trunked radio systems has always interested me. Turns out, the alternative can beat the real McCoy in many ways. The primary disadvantage is loss of mobility unless you enjoy hoofing around with a computer and two scanners strapped on your back.

This month's centerpiece is a revised (from July-98) Data Decoder Interface that's compatible with alternative means of trunk following and other decoding. My July-98 column will be helpful to the project. (*MT* offers low cost reprints.) Today's article may be sufficient, particularly if you follow the References sidebar.

■ What's Wrong with a TrunkTracker?

Absolutely nothing, unless you already own conventional scanners. Many hobbyists have several radios or even a tried and true favorite, and are hard pressed to buy another just for a specialized feature.

Tracking the trunks is still a specialized feature right now, even though monitoring public safety and local governments in action is anything but a specialized activity for anyone owning a scanner. It's the fundamental core of our hobby, right? So all radios should be able to track the trunks and we should not be forced to accept a limited few for that purpose, particularly when those few have features we don't want, or not enough of what we do want.

For newcomers to the trunked radio scene, there are three references in the sidebar where trunked radio can be explored in depth. You'll learn that it's almost impossible to manually follow trunked conversations. That doesn't mean you have to cough up for a real TrunkTracker, though. There are alternatives ...

■ Trunk Following Without a TrunkTracker

There are at least three ways to trunk follow without a real TrunkTracker. The first calls for an Icom PCR1000, R10, R8500, R7000, R7100, AOR AR2700, AR3000, AR3000A, AR8000, certain Kenwoods, Yaesu FRG-9600, or a Uniden BC-895XLT, a CI-V interface, and one other 800 MHz scanner of most any kind.

Another method calls for a PRO-2006

or PRO-2005 with an Optoelectronics OS-456 Interface, and a second 800 MHz scanner.

A third method calls for a PRO-2004, PRO-2005, or PRO-2006, a CE-232 Interface operated by Pro-Turbo, and a second 800 MHz scanner.

Not included here but worth a mention is that WiNRADiO is developing a means to automate following the trunks, but it hasn't been released at this writing.

Common to these alternatives are a computer and a simple circuit sometimes called a "data slicer" or a data decoder interface. While the alternatives use the same freeware programs (**Trunk** for Motorola systems, or **ETrunk** for GE/Ericsson EDACSTTM systems), each may also require a proprietary control program for the primary scanner. Each method differs from the others in detail, but the broad principle is depicted in Fig-1.

While the above radios and methods are all I know of at the moment for alternative trunk following, ongoing research should turn up more. Alternative trunk following is still in its infancy.

■ The Circuit Change

A “data slicer” or data decoder interface is required for the alternative means of trunk following, but some of those ways call for a small change to the circuit. Accordingly, I worked out a revision that keeps the circuit compatible with *all* current methods of tracking the trunks and decoding other data. Even if yours works perfectly at the moment, you might

want to make the simple changes now, just in case a grand opportunity opens in the future. (You know it will...)

Referring to the schematic and construction plans in my July-98 column, move the cathode of D1 from Pin 2 (TxD) of the DB25 connector to Pin 20 (DTR). Run a pair of wires out the back of the DB25 shell casing, one from the newly vacated TxD pin 2, and the other from a handy ground (Gnd) point in the circuit.

The reason for this is that certain trunk following methods require the computer/radio interface to connect to one COMport; the data decoder interface to connect to another COMport; and the TxD and Gnd pins of the data decoder interface to feed a third COMport at its RxD and Gnd pins, respectively. Some methods require only two COMports and the original data decoder interface, but one and perhaps other emerging methods may require a third port. It costs nothing to prepare for contingencies.

The Trunker and ETrunk freeware programs process data from CTS (pin 5). If output control signals are required for the primary scanner, those commands appear on the TxD (pin 2) which have to be piped back out, either to another interface or more likely back to another COMport. This is why Transmit Data (TxD) of one COMport is fed to the Receive Data (RxD) of another COMport in my example.

■ How to do it

Heck, it's all over but the shouting. Just follow Figs 2-3 and this article, except that it might be easier to remove the original D1 and replace it with a new 1N4143 diode. Don't forget to solder a pair of wires — one to TxD; the other to ground — and run them out the back of the DB25 shell. If and when you need them later, they'll be handy to splice and route wherever needed.

The generic configuration calls for two scanners, the primary one to be supported by the controllers in the Trunker and/or ETrunk programs. The secondary scanner can be 'most any that covers the 800-900 MHz trunked bands and must have the "baseband audio" modification installed. See Fig-4 and refer to my July-98 column for connection details. You can also download the latest connection data for many radios from my FTP site: <ftp://ftp.cts.com/pub/bcheek/faqs/scandata.faq>



FIG-3: DATA DECODER INTERFACE FOR TRUNK FOLLOWING

COMPONENT (Top) SIDE (DB-25 Shell Mount)

SOLDER (Bottom) SIDE (DB-25 Shell Mount)

LEGEND

- unetched pattern holes
- component footprints
- wires to be soldered to connector
- point to be soldered on other side
- point to be soldered on this side

NOTES

1. Cut off corner, but not rounded, allow 1/16" to 1/8" to the left of the corner. Cut, depending upon pin, may be to rounded corner, or flat, or the outer corner, or the inner corner. Leave sharp 1/16" to 1/8" to the left of the corner.
2. Align to be smooth, not rough as shown.
3. Align to be smooth, not rough as shown.
4. Align to be smooth, not rough as shown.
5. Align to be smooth, not rough as shown.
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24. Align to be smooth, not rough as shown.
25. Align to be smooth, not rough as shown.

COMPONENT (Top) SIDE (DB-25 Shell Mount)

SOLDER (Bottom) SIDE (DB-25 Shell Mount)

LEGEND

- unetched pattern holes
- component footprints
- wires to be soldered to connector
- point to be soldered on other side
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NOTES

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20. Align to be smooth, not rough as shown.
21. Align to be smooth, not rough as shown.
22. Align to be smooth, not rough as shown.
23. Align to be smooth, not rough as shown.
24. Align to be smooth, not rough as shown.
25. Align to be smooth, not rough as shown.

Specific instructions for the different means of trunk following are beyond the scope of this

NOTE
The latest IC and connection information for many radios can be freely downloaded from my FTP site at:

<http://ftp.ctcs.com/pub/bcheek>

From there, select the "Wags" directory and download a file called: scandata.fag

This file is periodically updated and is always available, even by e-mail: bcheek@ctcs.com

Schematic

metal chassis

shielded cable

Discriminator Chip
Pin listed in NT July-98 Table 1

tap hole

Existing scanner circuitry

1.0 - 4.7 uF tantalum

NOTE: The type of jack and plug depends on the available space in the receiver. An RCA jack is preferred if it will fit

RS #272-1434 capacitor
1.0 4.7

Chip and Pin listed in NT July-98 Table 1
See above Note

Typical type of cable RS-4236A or 42-2371

shielded cable

center conductor

ground lug or washer

shield

center lug

Jack

metal chassis

Pictorial

your instructions via the Trunker or ETrunk programs. The baseband audio of the second scanner is fed to the input of the data decoder interface, which connects to a PC COMport and is “read” by the Trunker or ETrunk software. Trunker or ETrunk processes, logs, and displays the trunked system data and then outputs control signals to the primary scanner. In a word, pick the conversation you want to follow from the Trunker or ETrunk display and it’s hands-off after that — pretty simple, actually.

Although Trunker and ETrunk can control selected scanners for automated trunk following, you can use these programs in single-ended mode to view and collect data on trunked

E-mail: bcheek@cts.com
 WWW: <http://ourworld.compuserve.com/homepages/bcheek>
 FTP: <ftp://ftp.cts.com/pub/bcheek>
 FAX: (619) 578-9247 anytime
 Postal: PO Box 262478; San Diego, CA 92196-2478

¹ - To avoid use of Uniden and Radio Shack's terms, TrunkTracker and TrunkTracking, I coined TrunkFollower and TrunkFollowing several years ago for use in a generic context.

Trunk & Trunk (freeware)
<http://www.atmel.com/demos/details/trunk.html>
<http://www.geocities.com/capacitors/1401/trunk.html>
<http://www.croftid.com/emuloc/Scanner/Trunk/CR9000.ETH>

CE-232-E Pre-Trunk TrunkFollowing
<http://www.wd.computer.ie.com/homepage/techinfo/trunk.htm>

Pre-Trunk for the CE-232 Interface
<http://www.les.mn.ca/~jabbas/pre-trunk.htm>

Software for the BC-9950-E
<http://www.automat.net.au/trunk.html> Freeware
<http://www.futurecanning.com/index.htm>

Trunked Radio Basics
<http://www.atarima.net.au/trunking/>
<http://www.bst.com/user/Chetp/jr/scaneng/c-scandata.htm>
<http://jpages.prlogi.net/tech/trunking.html>

Regional Trunked Monitoring Support Sites
<http://www.soc381.com/>
<http://www.steven1.com/~jutta/ctwearing/scaneng.htm>
<http://www.wtng.com/scan/cr1/index.html>
<http://members.aol.com/bvbrttd/for.html>

Official TrunkTracker Support Site
<http://www.trunktracker.com/>

Mini Trunk Support Sites
<http://hedge.mesa.ohioState/>
<http://www.rpdy.com/>

AR-9000 Trunk Support Sites
<http://www.tollit.co.uk/sharwood.html>
<http://www.mish.com/~mish/ark1.c>
<http://www.clark.net/pub/ah/grow/ctweng/>

Data Recorders and Decoding Interfaces
http://ftp.cct.com/pub/beltek/faq/ctwengdata_faq

Interfaces
<http://www.optoelectronics.com/> DF-985
<http://kavard14.scoop.intel.com/FreePage/CTbikes/> CE-232
<http://www.soc381.digex.net/traps/ctweng.html> CW

What difference does a dB make?

The Amateur Radio Relay League's Pacificon '98 amateur radio convention offered many informative talks on various aspects of radio. There were also activities such as transmitter hunts, door prizes, amateur radio licensing exams, and a radio-equipment flea market. There was even a contest where the contestants vie for top honors at sending Morse code on a giant key with their foot or their fanny (really)!

Most interesting to me were the talks on antennas and related topics. One of the several excellent talks which I heard was given by Roy LeWallen, W7EL. You may know Roy through his popular ELNEC antenna modeling software. Thinking over some of the things he talked about gave rise to this month's column.

When listening to a radio signal, a one decibel (dB) increase in signal strength is barely noticeable. Even three dB is only half an S-unit on your signal-strength meter; we don't usually think of that as an impressive increase. So is it worth our time and effort to select an antenna with no more than 3 dB or so gain above another antenna?

Well, if you are just tuning around for some enjoyable listening then a few dB increase in antenna gain probably won't impress you. On the other hand, if you are trying to copy some rare, weak DX (distant) signal, then a few dB gain in signal strength can be the difference between "almost," and actually putting that station in your log.

Where do we get extra dBs?

Let us say that you want to receive high-frequency (HF) signals from locations relatively close to you — a few hundred to several hundred miles away. For this kind of communication, near-vertical incidence skywave (NVIS) is the propagation mode of choice. NVIS is produced by an antenna which di-

rects its radiation-reception pattern (RRP) primarily upward. A horizontally-oriented halfwave dipole about a quarterwave above ground is a good choice for this mode, and is an economical and easily-constructed antenna.

On the other hand, if you want to copy signals from stations a thousand or more miles away you are probably going to do better with an antenna with significant low-angle component in its RRP. Raising the dipole to a half wavelength above ground will increase the antenna's low-angle radiation significantly, and make DX communications much more likely. The close-in stations should then be much weaker.

But....

But it is ground-mounted, quarterwave vertical antennas (with proper radial systems), not dipoles, that are well known for their low-angle radiation — and thus for their great DX performance. But LeWallen tells us something very interesting here: "Over most typical ground, a dipole up more than a quarter wavelength will produce more gain than a vertical, *even at low elevation angles*" (emphasis added). He goes on to say that improving the vertical antenna's radial system will

not change this situation.

We might wonder then why vertical antennas are the choice of many knowledgeable DX masters.

Clues

One clue to the vertical's popularity is that, over a good portion of the HF band, in order to get the dipole elevated toward the desired (for DX) half wavelength height we would need some impressively high towers. Even at wavelengths as short as 30 meters (10 MHz) we would need antenna supports almost 50 feet tall for holding the antenna a half wavelength above the ground. At 60 meters (5 MHz) we would need almost 100 feet!

And so, for much of the HF band, getting dipoles up high enough to do their best for DX work is just impractical for most of us. On the other hand, a quarter wavelength vertical antenna is less than 25 feet tall at 30 meters — not an impractical construction job for many of us.

Another clue to the popularity of vertical antennas among HF DX aficionados is the heavy dependence of received-signal quality (i.e., how easy the signal is to copy) on the ratio of received-signal strength to received-

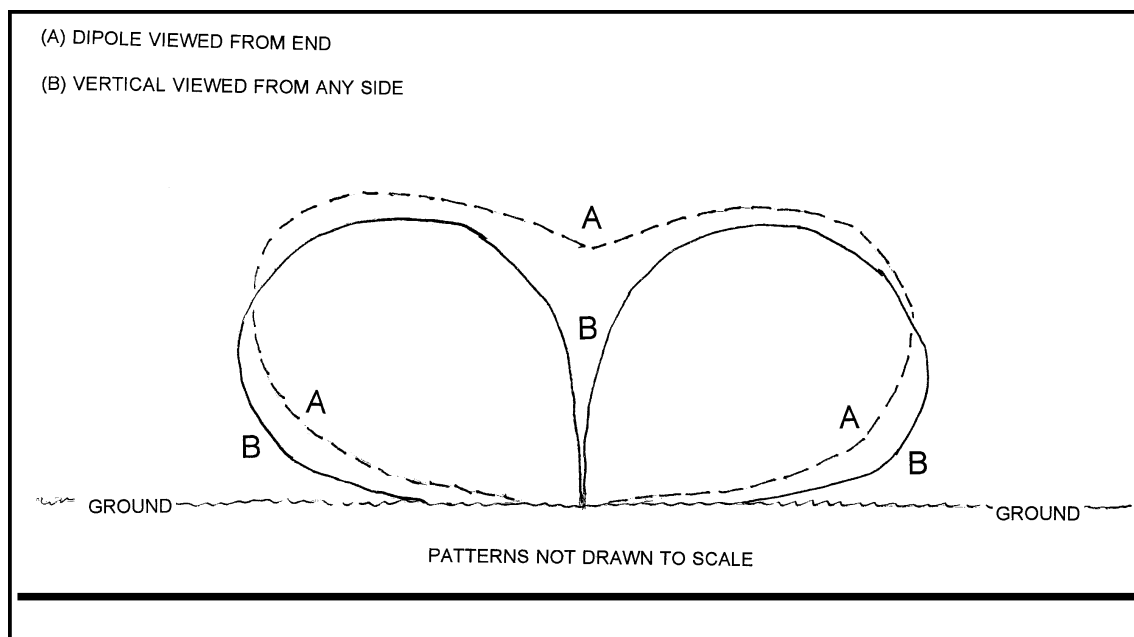


FIG. 1. Vertical radiation patterns over real ground of a halfwave dipole mounted a halfwave above ground (A), and a ground-mounted, quarterwave vertical antenna (B).

noise strength (received S/N). When the received noise on the HF band exceeds the internal noise generated in the receiver (as is very frequently the case) then the quality of the received signal is determined largely by the received S/N. In this case getting a few more dB from an antenna is not necessarily going to improve a signal whose quality is already fairly well determined by the received S/N.

One more clue comes from the patterning of the vertical antenna with its emphasis on low-angles. This pattern, *over real ground*, is less responsive to signals arriving at high angles than is the horizontal dipole. Another factor is that the nulls in the horizontal RRP off the dipole's ends become deeper at lower angles; the vertical has no nulls in its horizontal coverage. Thus the vertical, as compared to the dipole, has more capability to selectively ignore closer-in (usually stronger) interfering signals, and concentrate its responsiveness more on the DX signals.

■ And so...

So, when we can do it, raising a halfwave dipole a half wavelength above the ground will give us a decent DX antenna. On the other hand, a ground-mounted, quarterwave vertical antenna, with its few less dB gain, will outperform that dipole on many DX signals. And the vertical is often more practical to erect.

If you want more on the "why" of the points discussed above check the chapter on "The Effects of the Earth" in a relatively-recent copy of the *ARRL Antenna Book*. For more information on Roy LeWallen's excellent antenna designs and products check his website at www.teleport.com/~w7el.

● RADIO RIDDLES ●

■ Last Month:

I said: "When we change from a lower-gain antenna to an antenna with higher gain, we may find an increase in signal strength for stations we receive. And when a station to which we are listening increases its output power, we should find an increase in the strength of its signals."

"In many situations we can get the same amount of signal-strength increase from either a higher-gain antenna, or by increasing the power of the final stage of the transmitter. This latter increase in signal strength comes from additional current supplied by the transmitter's power supply. What is the source of the increase in signal strength due to increased antenna gain?"

Obviously, the increase in signal output of the higher-gain antenna is not due to an increase in the signal strength arriving at the antenna. What has changed is what the incoming signal encounters in the design of the receiving antenna. When we design an antenna to respond maximally to a certain azimuth direction or to a certain vertical angle of wave arrival, then signal output from the antenna is increased for signals coming from that direction or angle.

By appropriate antenna design the responsiveness that formerly was directed elsewhere

is redirected in the direction of the desired signal. Thus we receive the desired signal with greater strength, and undesired interference from other directions is reduced in strength.

■ This Month:

"Antenna modeling" is mentioned above. What is it?

You'll find an answer for this month's riddle, and much more, in next month's issue of *Monitoring Times*. Til then Peace, DX, 73


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Wireless Marketing Corporation
Schaumburg, IL USA 60173
1-800-259-0959
Visit us on the Web: <http://www.wirelessmarketing.com>

CHEROKEE™

Restructuring

If you read any of the amateur radio publications you know by now that a great deal of effort is being put into restructuring the amateur radio service. The ARRL (American Radio Relay League) has proposed a plan to allow easier access to the shortwave (HF) bands by all amateurs. Essentially the ARRL is proposing a plan that will allow operation of all legal modes on the HF bands to any amateur who has passed a code test. By coincidence the Federal Communications Commission (FCC) instituted a notice of proposed rule making (NPRM) very similar to the ARRL proposal at about the same time as the League began working on its plan!

The reasoning behind these proposals is to alleviate the confusion resulting from the present six classifications of license. Both the ARRL and FCC want to reduce the number of classifications to four. Exactly what these classifications will be called is still uncertain at this writing. Another reason is to attract more people to the amateur radio hobby.

Present thinking calls for allowing Novice and Tech Plus the same privileges as General licensees, while Advanced and Extra class license holders will receive additional phone spectrum in some bands. Perhaps by the time you read this, all will be ironed out and in operation.

One controversial issue is code testing; Presently both the ARRL and FCC feel two code speeds will be adequate — 5 and 12 words per minute. Naturally this does not suit everyone; some are looking for no code and others want to make the test harder. As in most cases, the final result will not please everyone.

Logically, allowing operation in the HF phone bands for most classes should encourage more citizens to enter the ranks of amateur radio, but past restructuring has not always worked out the way it was intended. In fact, when the license structure was revised in the mid 60s, many hams turned away from the hobby in frustration at having privileges taken away from them that they had enjoyed for years. Our hobby never really recovered from that blow — so I, for one, hope the new plan works well!

Radio Shack Strikes Again

Radio Shack is advertising a simplex repeater in their latest catalog. I was intrigued by the price of \$99 and decided to check one out.

What I found was a small package about five

ounces in weight and 3 x 2 x 2 inches. A speaker mike connector dangles from one end to allow connection to an HT. The unit incorporates an IC voice recorder to record about 20 seconds of voice; when the carrier is dropped, the repeater keys the transceiver it is connected to. All of this operation takes place on a simplex frequency.

While not a true repeater, it is indeed a range extender that should be considered when a simple-to-operate system is required.

I find the unit plus a transceiver fits easily into a five quart ice cream container, which does an excellent job of keeping everything dry. If an external high gain antenna is required, a bulkhead SO-239 mounted on the bottom retains the integrity of the ice cream container.

The repeater can be hauled up a tree or set up on a tower or high building and will really do an excellent job within its limitations. For search and rescue operations, as well as other public service events, this little unit can be a real help in getting things in operation quickly.

While advertised as a ham/business band repeater, I see no reason why users of the family radio service or the 49 MHz HTs could not benefit from this little gadget, though they may need modification if no jack is provided. All that is needed is a transceiver with a connector that will accept a standard speaker mike. (This apparently does not include Kenwood and Motorola, according to the Radio Shack catalog.) Give it a try!

Hiram Percy Maxim

A book that has just been re-released by the ARRL chronicles the life of the man commonly called the father of amateur radio. *Hiram Percy Maxim* by Alice Clink Schumacher went out of print in 1978 — a true shame as the life and times of Maxim were extremely interesting.

The book describes Maxim's childhood, education and his eventual professions of automobile experimenter, inventor and radio amateur. Did you know Maxim came from a long line of inventors? His father invented the Maxim machine gun and many mechanical and

electrical devices.

Hiram Percy Maxim invented the silencer (which eventually was adapted for use as a muffler on automobiles), air conditioning, and a wide variety of automobile devices. He also invented and designed automobiles of various types. Aircraft and astronomy were also among this man's interests. And Maxim was of course the guiding hand of the ARRL in the organizations early years.

I have one of the early copies of *Hiram Percy Maxim* and have read it many times, finding it as interesting at successive readings as at the first. I highly recommend this book to everyone! It's available from ARRL 225 Main St., Newington, CT 06111; price is \$19.95 plus \$3.00 S&H.

A New Computer

Santa was real kind this year and dropped a Compaq Presario off at the N3IK shack to replace my goose-quill pen. Yes, I have been active on the internet and have an E-Mail address; for the present, E-Mail goes to N3IK@hotmail.com. That may change when I find a regular service provider.

While I am on the Web, I can't say I have been addicted. I like a few features, but do find email the most useful. The ARRL Members Only site is interesting and a few of the other sites on hamming and outdoor activities are enjoyable. Tried a chat room a few days ago: UGH! I will continue rag chewing on 30 meters, thank you.

The Bands

While I have been very busy with my daytime occupation this past winter, I have found time to get on the air at times. I must say, 10 and 12 meters has been very good, and 15 absolutely super. My best band for DXing has been 40 meters. After getting up a good quarter wave on 80 meters DX has been coming easier, but persistent noise has limited me on 80 and 160 (noise seems due to industrial radiation of some kind). Two meters has been fairly good, with some openings into the South and Midwest during November. I have been off six meters due to an antenna problem, so have nothing to report on that particular band.

Topics of interest to this column are reports of band activity, plus photos and circuits of old-time radios, especially those circuits that may be easily duplicated.

73 de Ike, N3IK



Honey, I shrunk the FRS radio: Cherokee's Potent FR-460

Just when you thought it was safe to go back into the electronics store . . . just when you thought you could avoid that involuntary twitch of the fingers reaching for the VISA card . . . the folks from Wireless Marketing Corporation have come up with another reason to yank out the plastic and put a grin on your banker's face.

The "dangerous object" (the one that will cause you and your cash to take separate directions) is the Cherokee FR-460 Family Radio transceiver. Wireless Marketing Corporation, let me remind you, is the company that brought out single-sideband CB handi-talkies, the FR-465 Family Radio Service handi-talkie (arguably the most sophisticated unit available) and a number of other two-way radio products that show innovation.

So anytime a box shows up from Wireless Marketing, there is a fair chance that something interesting will come out of it. But I certainly wasn't prepared for the FR-460. This is certainly the leader in the race to build smaller and cuter FRS handi-talkies. The FR-460 measures just 2 inches wide by 3-1/8 inches high by 9/16 inch deep, excluding antenna. That's small enough to slip into almost any size pocket, belt pouch or purse. This pint-sized unit is roughly the size of a pager, and it weighs just 4.5 ounces.

Powered by three AAA batteries, Wireless Marketing claims the FR-460 puts out the full legal limit for FRS units: one-half watt. Available in three colors (yellow, blue or black), the FR-460 is a radio with no (count 'em), *NO knobs*. On the face of the unit, you'll find two buttons with up and down arrows, a button marked "F" for activating functions, a button labeled "M" (for turning off the auto-squelch and monitoring) and a button with a right-angle arrow symbol, very much like the Enter key on a computer keyboard. There is also a small grill for the speaker/microphone and a liquid crystal display that shows what's going on with the radio.

On the left hand side of the radio is a push-to-talk button and a small white On/Off button. On the top of the rig are the antenna and a dust cover that, when removed, reveals a plug for an optional speaker/microphone. At the top-most edge of the front panel is a tiny light emitting diode that illuminates red when the FR-460 is transmitting and green when the unit is receiving. On the back of the radio is a



Pint-sized powerhouse - The Cherokee FR-460 packs big performance into a tiny package.

plastic belt clip that swings aside to allow easy access to the hatch for the battery compartment. On the very bottom of the case are two metal contacts for use with optional metal hydride battery packs and drop-in charger.

In practice the FR-460 is easy to operate, once you get used to the scheme of things. If no other buttons are activated, the Up and Down arrow buttons raise and lower the volume of the speaker. The F button controls the channel setting (any of 14 channels), CTCSS (Continuous Tone Coded Squelch System) tone setting, scanning, priority scanning of three channels of your choice, keypad lock, and key tone. Each tap of the F button advances through the functions of the radio in a carousel fashion.

Once a function is selected, channel setting for example, the Up and Down keys can be used to change the channel. If you do nothing for five seconds, the FR-460 reverts to normal operation. If you change the channels and wish to do nothing else, press the Enter key to enter your selection and return to normal operation. Otherwise, you can press the F button again to access another function of the radio.

The FR-460 offers 47 different CTCSS tones. Activating any of these tones on any channel means that you will only receive signals on that channel which are transmitted with the same tone. The FR-460 allow different CTCSS tones to be assigned to different channels, so that you could use tone 1 on channel 1, tone 25 on channel 2, no tone on channel three, and so forth.

You cannot, however, assign different tones

to receive and transmit, and you cannot assign a tone to a channel and then turn it on or off at will - the act of selecting a tone for a channel turns it on. To de-select a tone for a particular channel, you must set the tone to zero. Nevertheless, this is a step ahead of FRS radios in which any tone that is activated is applied to all 14 channels.

Note well: the FR-460 offers 47 tones (and provides a list of them in the manual). Other radios offer 38 tones, and *they aren't necessarily the same tones*. That means, if you are planning to use different brands of FRS radios in the same group, you'd better figure out ahead of time which tones you are going to use and that they are compatible. (The easiest way is to use the tone list provided in the manual, but not all manufacturers provide such a list.) Otherwise, you could decide "let's all go to channel 7 and use tone 25" and find yourselves unable to talk to each other.

When the Wireless Marketing people sent me the FR-460, they said I might find the range isn't as great as the FR-465. They were right, but the range of the FR-460 is only a few yards less than the FR-465 and other "big gun" FRS radios I have tested. The audio quality both transmit and receive was excellent. In short, the FR-460 is a small radio that delivers big performance. If you want the ultimate in sophistication and flexibility, the FR-465 is a better choice. But for excellent performance in an unobtrusive, take-it-with-you anywhere package, the FR-460 is superb.

The suggested retail price of the FR-460 is \$179.95. For more information, contact Wireless Marketing, 1-800-259-0959, Monday-Friday, 8 AM-5 PM, Central Time or visit www.wirelessmarketing.com.

If you would like to monitor FRS frequencies, here they are.

Channel	MHz
1	462.7125
2	462.7375
3	462.7625
4	462.7875
5	462.8125
6	462.8375
7	462.8625
8	462.8875
9	462.9125
10	462.9375
11	462.9625
12	462.9875
13	463.0125
14	463.0375

GMT VS. UTC: PART 2

In our December issue, we discussed time standards. *MT* reader Doug Robertson pointed out something we missed: Why do we have both UTC and GMT? Isn't one enough?

Greenwich Mean Time (GMT), the original standard time, is based upon the rotation of the earth, which is slowing down; Coordinated Universal Time (UTC), established in 1961, is an absolute standard, based upon the vibration of the cesium atom. Every so often, the National Institute for Science and Technology (NIST) adds a "leap second" to bring the two standards closer together.

So why is Coordinated Universal Time abbreviated UTC? To keep it linguistically impartial. In French (Paris is the home of the International Time Bureau) it would be TCU, and in English CUT.

Thanks, Doug, for the additional classroom discourse on science and diplomacy!

Q. Since portable radios use whips, why do radar detectors use

an internal horn? (Paul Klahn, Milwaukee, WI)

A. For the most efficient signal delivery to the radio, the higher the frequency (shorter wavelength), the shorter the antenna should be to properly match the arriving wave. The down side to this efficiency business is that the shorter the antenna, the less signal it intercepts.

Scanners use whips designed primarily for the 100-900 MHz frequency range, but radar detectors operate in the 10,000 MHz range, so their most effective antenna length would be so short that very little energy would be intercepted. Thus, the horn "funnels" the captured signal to the tiny internal antenna, giving it considerable gain over the simple whip.

Q. What frequencies do the little remote-doorlock activators for cars operate on? Which travels faster, light or radio waves? (William Mewes, Oakville, Ont)

A. The remote activators may be on various FCC-coordinated frequencies in the 200-400 MHz range, just like garage door openers. Since they are very low power, they are unlikely to interfere with military aircraft operating in the same frequency range.

All electromagnetic signals propagate at the same velocity in the vacuum of space, approximately 186,000 miles (300 million meters) per second. Only when they become confined by matter (light pipes, coaxial cable, seawater, soil, etc.) do the velocities vary.

Q. I am considering building a metal frame house; the manufacturer's literature claims that this construction method doesn't interfere with radio or television reception since the signals can pass between the metal elements. Is this true? Would the metal frame house serve as a good radio ground for an external antenna?

A. The transparency of the house to radio

Bob's Tip of the Month

Converting an AM/FM Radio for Aircraft/Public Safety Reception

One of the simplest home projects for a snowy day is to convert a pocket AM/FM radio to receive 118-137 MHz aircraft (even though that service is AM), or even 144-174 MHz VHF ham/weather/public safety band (even though that service is narrow FM)! You should have some familiarity with electronic components to perform the simple procedure.

Kevin Michaels of Honolulu reminds us that the modification isn't permanent and, if you wish, you can even reverse the procedure to restore the original wideband FM broadcast reception. Any inexpensive AM/FM portable will work, most notably the \$9.95 "loss leaders" found in most department stores, or the dollar bargain at flea

markets and yard sales.

Popping the back off will reveal the critical components: two open-wound, copper wire coils next to the tuning capacitor. These will need to be stretched longer to change the tuning range higher in frequency. It's actually quite easy, but make a note of the spacings of the two coils now so you can always set them back to the FM broadcast band later if you choose to.

The procedure:

Tune in an FM station at the top of the dial (near 108 MHz), then touch your finger lightly to each of the two coils to determine which is the oscillator coil by its wild shift

in frequency. Now carefully, with a small screwdriver, spread the turns, while alternately tuning the dial downward to keep up with the station, until you hear that station at the bottom of the dial (88 MHz). If the station sounds much weaker, you may spread the turns of the other coil proportionately to peak the signal.

Now, by tuning upward, you should be able to hear 108-137 MHz aircraft signals. If you spread the turns further, thus increasing the frequency, you should hear 146 MHz hams, 150 MHz digital paging, 154 MHz police, 162 MHz weather broadcasts, and so on.

A fun project, and if it doesn't work, you can always still listen to your favorite local FM broadcaster! Thanks, Kevin.

signals depends upon the relative lengths and spacings of the metal elements compared at different frequencies, just as it would to the elements of an antenna.

The lower the frequency (longer wavelength), the wider the spacings must be to allow passage of the waves. Even if the signals get through the "holes," they will still reflect from internal metal structures, and reception will vary from location to location.

For the manufacturer to say such a structure will not interfere with radio or television reception is unrealistic. It will interfere, and unpredictably.

So far as being a radio ground, a better term would be "counterpoise." You could probably use the house itself for a random-length antenna, and depending upon where you tapped its signal, it could be used for shortwave, mediumwave, and even VHF/UHF.

One interesting prospect would be to run a wire from one end of the roof out to a tree or pole; you could attach the shield of your coax to the house metal, and the center conductor to the wire. Or you could attach the center conductor to the base of a vertical antenna on the roof, still using the house metal as a counterpoise for the shield connection.

The problem with such a configuration is that, since the house becomes a part of the antenna, it would pick up enormous quantities of electronic noise from all of the equipment and accessories throughout your home.

Q. I have several articles about shortwave going digital by 2002. What will that do to our present shortwave radios? (Melvin Friedman, Suffolk, VA)

A. It would render them useless — if it were true. There is no such pending rulemaking. Several digital techniques have been tried experimentally by the international broadcasters, but none has been enthusiastically endorsed.

While there is going to be an additional two megahertz of spectrum allocated to the shortwave broadcasters, it won't be implemented until 2007, and the mode will be single sideband, not digital.

Q. Where can I buy a used broadcast transmitter? (Various)

A. There are several magazines you may probably see at a nearby radio or TV station. I haven't seen *Broadcasting* in many years, so

I don't know if it's still around, but others include *Radio Shopper* (511 18th St. SE, Rochester, MN 55904; ph. 507-280-9668; Web www.radioshopper.com); *Radio World* (PO Box 1214, Falls Church, VA, 22041; ph. 703-998-7600; e-mail 74103.2435@compuserve.com); and *BE Radio* (PO Box 12902, Overland Park, KS, 66282-2902; fax 913-967-1903; Web www.beradio.com).

Q. I have a small Grundig multi-band portable radio. The dial shows broadcast coverage from 530-1710 kHz, but the instructions say 525-1725 kHz. Which is right? (Bob Brock, Phoenix, AZ).

A. I'm assuming that you have an analog, not digital, dial. The radio dial is actually calibrated to show the American medium wave bandplan (540-1700 kHz), including Traveler's Information Service (TIS) allocations at the bottom and top (530 and 1710 kHz).

The specifications in the manual probably reflect the maximum "overrange" that the dial is capable of tuning from stop to stop (525 to 1725 kHz).

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TrunkTrac, the first, and one of the most sophisticated trunk tracking technologies available, is now even better. New pricing and additional features make TrunkTrac your best choice if you're serious about tracking Motorola Type I, II, III, and Hybrid systems. TrunkTrac now supports the BC895XLT, PCR1000, R7000, R7100, R8500, R9000, and the RS Pro 20xx series with an OS456/535 board installed.

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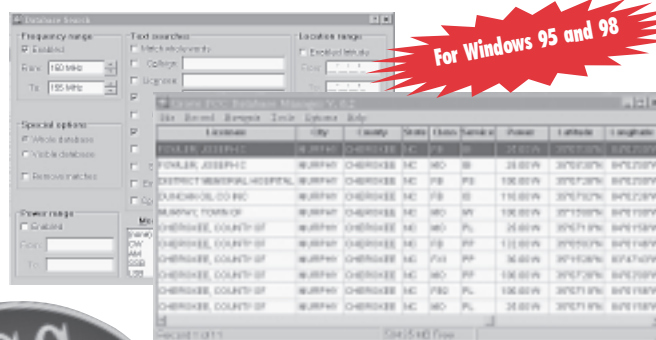
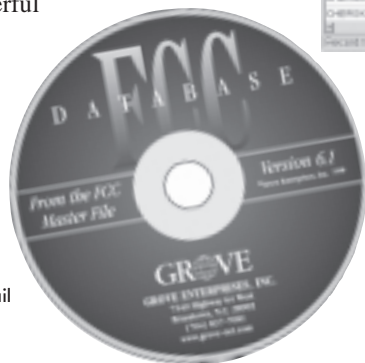
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Radio Shack PRO-2066 Mobile Trunking Scanner

The new PRO-2066 is a mobile scanner made in the Philippines for Radio Shack by Uniden. It differs from its mobile predecessors in two significant ways: trunking capability and improved image rejection.

The PRO-2066 can follow conversations among talk groups in most Motorola trunked systems in addition to scanning to activity in the conventional frequency domain. Though you could use a BC235XLT portable or large BC895XLT in your car, the PRO-2066 is specifically marketed for mobile use and is built in a DIN-E size cabinet.

It employs triple conversion and a 380.7 MHz IF (intermediate frequency) which rejects images better than its PRO-2046 (reviewed in Oct. 1996 *MT*) and BC760XLT ancestors, which used 10.85 and 10.8 MHz IFs, respectively.

■ Physical

The PRO-2066 is housed in a metal case and has a plastic front panel. There's lots of extra space inside the cabinet. This model is marketed for mobile use, but the rubber keys are not backlit and the numeric keys are tiny — their labels are difficult to read. Key depressions are confirmed by a tone burst, which can be disabled.

A steel mounting bracket is supplied, but there are no rubber feet to prevent the bottom of the cabinet from scratching a table. The internal 8 ohm, 5 watt speaker is bottom mounted and a 1/8" external speaker jack is located on the rear panel.

An AC power supply is not included. You must connect the included DC cable to a source of 13.8 VDC or purchase an optional power supply capable of furnishing at least 500 mA. The external supply should be well filtered and our PRO-2066 seems fussy in this regard. The Uniden AD580U 700 mA wall wart furnished with our BC9000XLT has a 98 millivolt AC ripple that causes our PRO-2066 to hum loudly.

There is no hum when using a high quality laboratory power supply that furnishes cleaner DC voltage with only 3 millivolt AC ripple. Neither do we hear ignition noise when using the PRO-2066 mobile, even though it's connected to the cigarette lighter outlet.

We won't modify the PRO-2066 because it is on loan from Tandy headquarters. However, experimenters can access the PRO-



2066's circuitry to tap the baseband audio for a CTCSS reader or data slicer by removing the four screws that hold the RF/IF board. You can then unplug the ribbon cable from the motherboard and tilt the RF/IF board up to reveal the IF chip. The board is attached to the BNC antenna jack by a bare wire that appears easy to unsolder if required.

Gobs of hard, black epoxy cover the front end bandswitching circuitry to hamper virtual downconversion tinkering.

■ Memories and Scanning

The PRO-2066 provides only 150 programmable memory channels, organized into five banks of 30 each. You are warned when you try to program a duplicate frequency into a memory channel in trunked mode, but not in conventional mode. A 2 second rescans delay and lockout flag may be associated with each channel for conventional scanning. Banks may be scanned individually or in any combination at about 70 channels per second during conventional memory scanning. One channel in each bank may be designated as a priority channel and checked for activity at 2 second intervals.

Motorola 800 MHz Type I, Type II, and hybrid analog trunked systems may be scanned, too. Like other Radio Shack and Bearcat trunk scanners, only one trunked system may be scanned at a time and you cannot scan a mixture of trunked and conventional systems simultaneously.

Talk group and fleet numbers, not frequencies, are displayed while searching or scanning in the trunked domain. The index number of the channel (i.e., 1 to 5 in a five-channel trunked system) is displayed as well. The PRO-2066's rescans delay, hold, and lockout operation is similar in both trunk and conventional domains, like

the other trunk tracking models.

As in the PRO-91 (reviewed in Dec. 1998 *MT*), the PRO-2066 can search or scan for active talk groups in the trunked domain and lock out up to 100 uninteresting talk groups. Trunk groups can

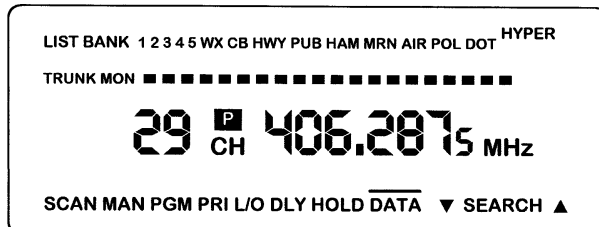
be stored temporarily into the five monitor memories during a search. You can program up to five lists per bank with talk group numbers for scanning. Each list can hold up to 10 group IDs.

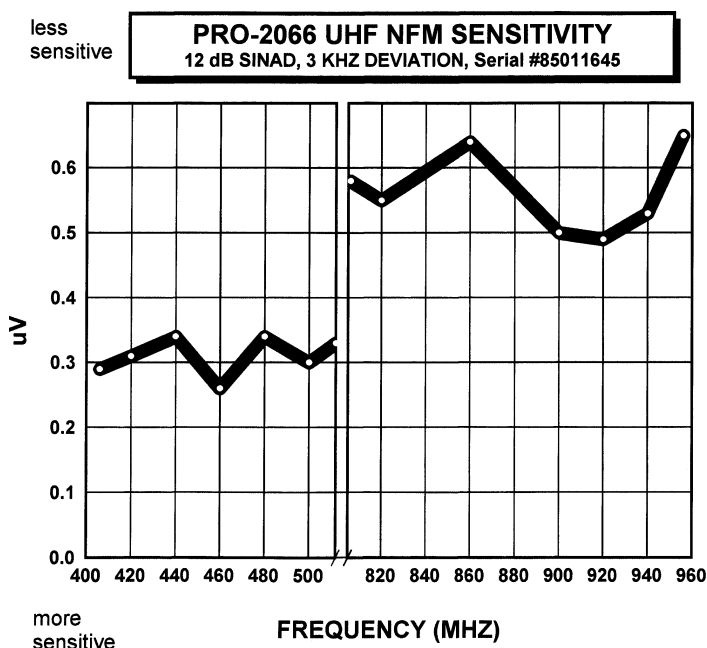
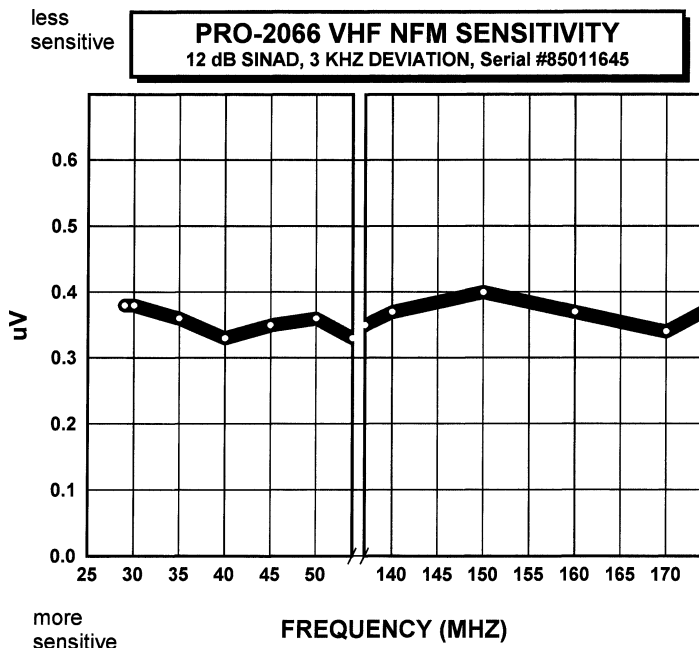
Most of the trunked systems we monitor use five frequencies. Rather than "waste" the remaining 25 channels in the bank, we program the 25 in conventional mode and lock out the trunked frequency channels. If the lockout is performed while in conventional mode, you can still scan the trunked frequencies in trunked mode and the other 25 channels in conventional mode (though not at the same time).

■ Searching

The PRO-2066 supports three types of searches: Limit, Direct, and Service. One pair of limits may be programmed for a Limit search. The Direct search starts searching from the currently displayed frequency, somewhat akin to a VFO.

There are nine sets of preprogrammed frequencies for Service search, including groups for Weather, Citizens Band, Highway, Public Safety, Ham, Marine, Air, Police, and DOT (Department of Transportation) frequencies. The CB service bank is new and sometimes fun to monitor. As in the PRO-91, the Police bank omits 460 - 460.5 MHz frequencies, which are used by Chicago PD and others. We don't know if this omission is intentional or merely an oversight.





You can skip up to 20 frequencies during a Limit or Direct search. Another 20 frequencies can be skipped during Service searches. Pressing the Hold key temporarily halts any of the searches.

■ Usability and Performance

Our PRO-2066 has little or no image problem and only 13 birdies strong enough to break squelch during a search, all occurring above 406 MHz. It does suffer from pager intermod on several 157 MHz marine chan-

nels and occasional intermod in the 462 MHz range.

We torture mobile and portable scanners by parking 1/4 mile away from a combined cellular phone and PCS (personal communications system) transmitter site. Under these line of sight conditions, our PRO-2066 hears lots of cellular signals in the VHF-low band, some in the air band, and just a few in the 800 MHz range. Once we leave the cell site, the problems disappear and mobile reception shines over the RELM MS200 and Uniden BC760XLT.

There are no noise bursts at the end of trunking transmissions; however, there is a noise burst of moderate duration while the squelch closes after each conventional transmission. The PRO-2066 audio is substantial when used with an external Motorola speaker inside our pickup truck.

■ Bottom Line

The PRO-2066 is a good mobile scanner, especially for people who live in areas served by trunked systems. It provides cleaner reception than its predecessors, though we wish it contained a CTCSS decoder and lighted controls. The requirements for a well-filtered AC power supply, lack of rubber feet, and a bottom mounted speaker make our PRO-2066 less suitable for base use.

■ Improved Feel for Drake R8B Tuning Knob

The R. L. Drake R8B's plastic tuning knob

is hollow and lightweight. J. W. Schermerhorn weighted the R8B tuning knob by using steel BBs to give it a heavy flywheel feel.

He wrote, "I mixed the BBs with slow setting epoxy and poured it carefully into the knob. I used as many BBs as I could fit in the knob and distributed them evenly for good balance. I left some space on the surface to level the epoxy so the BBs wouldn't stick up. It's important to use slow set epoxy so you have enough time to fill the knob and level the mix. I'm very satisfied with this mod. It gives the knob a nice flywheel effect."

■ Download Uniden User Manuals

Lose your Bearcat instruction manual? Thinking about buying a new Uniden scanner? User manuals are now available for download free from Uniden's web site: <http://www.uniden.com/docs/service/support.htm>. To read the manuals, you need to have a copy of Adobe's Acrobat reader program on your computer. Thanks, Uniden!

MEASUREMENTS

RADIO SHACK PRO-2066 SCANNER S/N 85011645

Frequency coverage (MHz):

26.965 - 27.405 (AM, 5 kHz steps)
29 - 54 (5 kHz steps)
108 - 136.975 (AM, 12.5 kHz steps)
137 - 174 (5 kHz steps)
406 - 512 (12.5 kHz steps)
806 - 823.9375, 851 - 868.9875,
896.1125 - 956 (12.5 kHz steps)

FM modulation acceptance: 13 kHz

Image rejection due to 1st IF:
53 dB at 155 MHz

Audio output power

1.77 W @ 10% distortion

Birdies strong enough to break squelch during search: 13

Practical memory scan speed:
70 channels/sec.

Search speed, Turbo: 299 steps/sec.

Search speed, regular: 97 steps/sec.

Intermediate Frequencies:

380.7 (approx), 10.85, and 0.450 MHz

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Recalling a saved database is sometimes "interesting." It appears that the program can open more than one database simultaneously. However, it can only display one at a time. The first one loaded is the one that stays displayed. In order to operate on a different database the second has to be loaded. Then under the File menu, select Close. A Close Database File box will then be displayed. Highlight the first file which you want to close and click OK. The second file will then appear. (To be honest, I'm still not sure I'm doing this in the proper manner. But it works.) I found I sometimes had some screen corruption which was corrected by minimizing and then maximizing the screen. It's not that bad, just a bit awkward in operation.

Finally, as with any database program, the results are only as good as the initial information. I have had reports that the FCC database has some missing, or inaccurate data. What a surprise! Don't blame Grove on this one; speak to your Congressman instead. Also remember that military and federal users are not included in the FCC file.

■ The first search is the deepest

Now don't go away thinking all searches take 20 minutes. Don't forget, we searched on the entire FCC database the first time. Now that we have our Liverpool database we can quickly search within it. For example, if we want to find Liverpool frequencies for our VHF/UHF scanner, then all we have to do is a Frequency Search on our newly created Liverpool database. This is done by clicking on the Frequency Range box and entering 30 MHz and 900 MHz. Below this entry select the "Special Options" Visual Database circle. Then click Search. This search only took ONE second to find the 116 matching VHF/UHF entries. Not bad at all.

■ No-cost updating - almost

You read right. When the FCC updates their database it will be put on their website at: www.fcc.gov/oet/info/database/raeddf.html

You can then download it and the upgrade is yours free. Grove warns that the new database file, when downloaded and unzipped, will occupy 1 Gig of hard drive space! Grove's program does not require a large amount of hard drive space since the big FCC file stays resident on the CD-ROM.

With the prices of CD-ROM record drives falling to below \$299 it may be the right time to purchase one. This would allow you to save all updates to a CD-ROM, thereby keeping your hard drive space free. I recently bought a

Ricoh MP^a6200S and found it very useful for archiving all types of programs.

■ Sorting it all out

At \$39.95 and \$5.50 shipping and handling, the Grove FCC Database V6.2 is an inexpensive and useful addition to any monitoring station. Just be prepared to take some time setting up your personalized initial databases. This will greatly reduce the search times and leave you more time to enjoy monitoring. It's available from Grove via their website at www.grove-ent.com, by telephone at 1-800-438-8155 and by mail from 7540 Highway 64 West, Brasstown, NC 28902-0098.

■ The COMDEX Report

Speaking of NC (no - not North Carolina), like so many other hyped products it appears that the NC (Network Computer) is now just a memory, or at least that's what many folks at COMDEX thought. In fact there was even one seminar session devoted to why the NC failed. The NC was an attempt by some misguided business people to get the price of a PC-like device down to \$500. The reality was that this scheme suggested a retrograde step in computing.

Due to the cost of computers in the early days, there was one central computer and many terminals connected to it. The terminal had little intelligence and simply provided a keyboard input and video output for the central computer. This gave rise to centrally-controlled databases and information czars who controlled the central computer and therefore the information and power. This was corporate computing in the eighties.

The NC people, led by a database company just itching to get into that czar position with the people of the world, revived the idea and

tossed it out as the concept to save the computing world. Well, three years later, even their most ardent corporate supporters like Federal Express have all but abandoned the NC. Bye-bye to recycled technology packaged like a new concept.

WinRadio and ICOM were showing their wares at COMDEX. ICOM introduced an economy version of the IC-PCR1000, called the IC^aPCR100. It's an external unit that does not have a sideband mode and only goes down to 6 kHz selectivity. I assume the cost savings is in omitting the filtering which allows the '1000 to go down to 2.8 kHz in selectivity. The IC^aPCR100 is aimed at the \$300-400 price range.

■ Here's looking at you, kid

Digital imaging was everywhere at COMDEX. Very soon, film-based photography will lie next to 8mm home movie cameras. The price on digital still cameras with 640 x 480 resolution is expected to be near the \$120 mark very soon. 1200+ resolution cameras are about to be introduced under \$300.

On the other visual end, flat screen, LCD (liquid crystal display), full color, super VGA computer monitors at the \$800 level were available around the show. These were in the 14 to 17 inch size and looked fantastic. However, rumor has it that due to a coming glass shortage the price of these monitors will actually rise in the next six months! Is the rumor real or a ploy? Probably a little of both.

What they don't tell you is in the next two years the traditional CRTs (cathode ray tubes) will start losing lots of market share to LCDs. They will counter with price drops and LCDs will have to follow along or fold their hand. (You see I *did* do a bit of casino watching while attending COMDEX in Vegas.) Only the electronics industry is crazier. Let the games begin!

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Crane / Sangean's CCRadio

By Hans Johnson

The Taiwanese radio company Sangean and the American outlet store C. Crane Company have always enjoyed a close working relationship. Now they have a radio designed by engineers from both companies. Billed as "the ultimate AM/FM radio," the new CCRadio is the fruit of this partnership, a set specifically designed to receive the spoken word.

■ The Basics

If you've ever held a Sony 2010, you know the size of the CCRadio. For those wanting more precise specifications, they're 10-3/4 inches by 3-7/8 inches by 6-3/4 inches, with a weight of about 4 pounds.

What immediately catches the eye is a large 5 inch midrange speaker that emphasizes voice and dominates the front of the radio. While this is a portable set, it has a wide and padded bottom, so the CCR always stands upright. Thus both the speaker and the controls face the listener. A slight incline to the top of the set and large controls on the top and side make them easy to see and operate.

The CCRadio's bands include American FM (87-108 MHz) and AM (520-1710 kHz), audio for television channels 2 through 13, and all seven weather band channels in the 162 MHz range. In a cost-saving move, shortwave is *not* included on this set.

Tuning is via a large rotary knob on the set's side or by up and down buttons. While there is no keypad entry, the radio has a seek function and there are five memories for every band except weather. It does take some twirling or pushing to go from one end of the band or the other. Nice features include separate treble and bass controls, a lock switch, a dial light that can be turned on or off, an alarm, and a sleep timer.

The back of the CCRadio has a battery panel that takes four D cells, which will power the radio for days on end. There are screw jacks for both an external AM antenna and a ground. A plug-in for an AC cord (it's included) and a molded carrying handle round out the back of the set. A reset button sits by itself on the bottom of the set.

■ How it Sounds and Rates

It sounds great, thanks to the large speaker that faces you. Reception on AM is good with the recommended longwire antenna. Reception is also good with the ferrite core, but you'll need a quiet listening environment to take full advantage of the radio's capabilities on this band. The radio's pushbuttons cannot tune in 9 kHz increments, so you'll have to use the rotary knob if you are DXing for foreign stations.

What you do tune in, both here and abroad, will sound very nice, particularly programs with a lot of speech, such as talk radio or sports.

The FM tuner isn't quite as good as that on the Sony 2010 or on the treasured Panasonic RF-2200. It does the job, though, and you can pull in quite a few stations with a 17-inch whip antenna that swivels.

Stations on FM have a nice full sound rather than the rather tinny sound that most portables put out. There is no stereo reception, though, even through the 1/8-inch headphone jack, which doesn't produce audio to equal the speaker, even through a professional set of headphones. There is no separate tape jack, but recording quality is acceptable through the headphone jack.

The reception of TV audio is fine for program listening, but this is not a DX tuner. Expect it to pick up your local station, not DX catches. This band was included for those wanting to catch a particular show, but who cannot be glued to the screen for it.

Reception of weather band stations is average. The set will pick up the stronger stations, but don't count on it to receive a station if you are in a fringe area. The manufacturers have also included an alert system on the weather band. If the National Weather System issues an alert on the weather station you're tuned to, the radio will warn you either by a siren tone



"CCRadio, see what they done done!"

or with a flashing light.

It is a shame that the radio does not include the SAME (specific area message encoding) alert system, though. SAME allows a user to program his weather radio to only receive warnings for one's county or city. Without it, the listener receives alerts for situations anywhere within the station's coverage, meaning that at least some of the warnings you receive will be unwarranted. Listeners to alert radios without SAME have been known to turn off the alert system after a few "false" alarms.

■ The Real Deal

With a selling price (including shipping) of \$159.95, you don't get the ultimate AM/FM radio, but you do get a good radio and a heck of a value. The set looks good and the controls are easy to operate. The attention paid to the type of speaker, its quality and location, make the CCRadio a pleasing radio to listen to day in and day out, whether it is for the bedside, the kitchen, or the workshop. The inclusion of the weather band is nice, but the alert system is of limited value without SAME.

The set is available via C. Crane at 1-800-522-8863, or find them on the web at <http://www.ccrane.com>.

WHAT'S NEW?

TELL THEM YOU SAW IT IN MONITORING TIMES

Icom's Teensy New Scanner Delivers Big Performance



The new R-2 shirt-pocket portable from Icom is now in distribution; our evaluation unit was impressive. This mini-scanner could seemingly get lost in a shirt pocket, yet comes with flex whip, NiCd batteries and a wall charger, as well as a belt clip and carrying strap.

A look-alike to the recently released Q7A transceiver, the R2 boasts continuous (less cellular) 495 kHz-1300 MHz reception in WFM/FM/AM modes, 450 memory channels, excellent sen-

sitivity, and a much improved scanning speed over Icom's venerable R10.

A complete review by Bob Parnass of this new scanner will appear soon in the pages of *MT*. The R2 is available from Grove Enterprises for \$219.95 plus shipping, and from other *MT* advertisers as well.

Secure Satellite Communications

The KVH Tracphone is used by commercial and recreational boaters as well as the U.S. Coast Guard and U.S. Navy. It is noted for its three-axis gyroscope-stabilized mobile satellite antenna for reli-



able, emergency back-up communications. A high degree of protection is already provided by its digital signal, but a higher level of security is now available to government, military, and law enforcement agencies.

Tracphone makes use of Skycell service, owned by American Mobile Satellite Corporation. A new national security standard for encrypting voice and data over public telephone networks is known as Secure Telephone Unit-Type III (STU-III). "Tracphone users can access the secure Skycell service simply by plugging a standard STU-III telephone into an STU-III Interface Unit that has been connected to the Tracphone's serial data port," said James Dodez, VP of sales and marketing at KVH.

For more information call KVH at 401-847-3327 or visit them at www.kvh.com.

Swagur-Timestep

Swagur Enterprises is pleased to announce an agreement with *Timestep Electronics Ltd.* of Great Britain to market its products in the United States and Canada. For the first time, Swagur Enterprises will be in a position to offer a complete line of Weather Satellite devices.

In addition to our world class Low Noise Amplifiers, Feed Horns, Bias-Ts, Dishes and the SuperSwagursat, we will now offer a complete line of *Timestep* products such as WEFAX, APT Receivers, Windows Software, Preamplifiers, and several choices of Antennae.

We will offer *Timestep* complete HRPT systems and components such as feeds, low noise amplifiers, Windows software, plug-in cards, stand alone receivers, coaxial cable, and much more.

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To those who already own one or more *Timestep* products we will be happy to assist in providing the many updates which *Timestep* has made available to its existing customers. Naturally, we will also assist present customers with any problems they may be experiencing. Feel free to contact us if you already own a *Timestep* product. We can tell you about the various updates to which you may be entitled. You can reach us at Box 620035, Middleton, WI 53562 or Phone/Fax us at 608-592-7409. Our email is swagur@execpc.com. Our Web Site is swagur.com.

Stu Gurske, President

Modem Protection

Electronic Specialists, Inc., can help guarantee reliable transmission of high speed data with their upgraded Model PDS-11 56K modem doubler. The PDS-11 pro-



vides four-stage spike suppression and radio frequency interference filtering, while also protecting connected computer equipment. Interstage suppressor buffering and fused phone leads also improve and protect system operation. The PDS-11 56K modem protection lists at \$74 from Electronic Specialists; call 800-225-4876 or visit www.electspec.com

1999 WRTH

The newly revised *World Radio TV Handbook-The Directory of International Broadcasting* by

new editor David Bobbett is out, and I am pleased to report that it continues to set the standard as the most comprehensive publication for the expert or the casual listener.

Retitled *WRTH*, the 1999 edition has a new cover, has increased in size to 640 pages with 64 glossy pages of color, and offers a wider variety of equipment reviews and articles. Tabs for thumbing through the inch and a half thick book to the region of interest are created by shaded blocks — a very welcome feature.

The Features have been redesigned to include reviews, space weather, propagation, and antenna advice in a more accessible format. The Directory is subdivided into *national* world radio and



TV sections and *international* radio services. For bandscanning purposes, mediumwave as well as shortwave stations are sorted by country and by frequency in the international section.

The Reference section contains miscellaneous information that includes broadcasting and listeners organizations and a by-country index. Omitted from this edition is the guide to English language broadcasts.

The new *WRTH* is a keeper, one I strongly recommend. (It's available from several *MT* advertisers, including Grove Enterprises at 800-438-8155 or www.grove-ent.com for \$24.95 plus \$5.50 shipping.)

— Gayle Van Horn

Police Call 1999

For many decades now, *Police Call*, published by geographical region, has enjoyed the well-de-

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DEALER INQUIRIES INVITED

served reputation as the ultimate scanner frequency guide. Formerly listing only law enforcement agencies, the more recent volumes, include as well railroads and aircraft, highways and forestry, hotels and schools, amusement parks and sporting events, hotels and utilities, and more.

Excellent tutorial text provides overviews of scanning and accessories, with emphasis on the all-important antenna system. Trunk tracking basics are discussed, ten codes are listed, and a glossary of commonly-encountered public safety terminology is presented.

Police Call, now edited by Richard Barnett, is \$12.95 plus \$5.50 shipping (specify your state) from Grove Enterprises, call toll-



free (800) 438-8155, or e-mail order@grove-ent.com.

Buying a Used Shortwave Receiver

Ready to buy a used shortwave receiver? Fred Osterman's new, illustrated trade-in guide is just the ticket to bring you up to date on descriptions and market prices of recent-vintage, popular shortwave radios. Covering the best known receivers from Kenwood, Icom, Yaesu, Grundig, Sony, Drake, Sangean, JRC, Lowe, Magnavox, Radio Shack, McKay Dymek, Allied, AOR, and many others, this

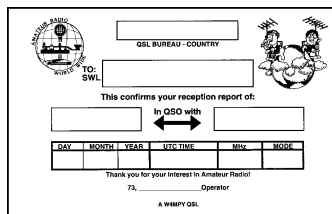


is a great pocket guide for the next hamfest flea market.

Buying a Used Shortwave Receiver is \$5.95 plus shipping from Universal Radio, 6830 Americana Parkway, Reynoldsburg, OH; ph. (800) 431-3939, or e-mail dx@universal-radio.com.

The QSL Man

In 1979 Wayne Carroll, W4MPY, started a part-time business printing QSL cards, which became so successful he retired from photofinishing to make it the family's fulltime business. You can view an assortment of designs from which to choose and



order straight off the Web at <http://mindspring.com/~w4mpy> or write to QSLs by W4MPY, PO Box 73, Monetta, SC 29105-0073; fax or voice 803-685-7117, email W4MPY@pbtcomm.net

Aircraft Tracking Software

If you are an aviation enthusiast and you've ever wondered how it feels to be an air traffic controller, here's your chance to find out, working with real-time flights. Andre Brendao's AirNav 2.10 is no game — it can track up to 1,000 real-time flights, by altitude as well as route. It can include and update weather details and predict arrival time to any waypoint. "Security" circles around each aircraft allows you to observe near-misses.

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- RT006, RT100 ICOM
- Most ICOMs with 10.7MHz IF.

Features

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- Instant Readout of Frequency any place on the PC's Display.
- Instant change of center frequency with a simple mouse click.
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- Signal Averaging, PLUS our exclusive "XARI-COLOR" Analysis.
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Many radio amateurs and SWLs are puzzled! Just what are all those strange signals you can hear but not identify on the Short Wave Bands? A few of them such as CW, RTTY, Packet and AmTOR you'll know - but what about the many other signals?

There are some well known CWRTTY Decoders but then there is CODE-3. It's up to you to make the choice, but it will be easy once you see CODE-3. CODE-3 has an exclusive auto-classification module that tells YOU what you're listening to AND automatically sets you up to start decoding. No other decoder can do this on ALL the modes listed below - and most more expensive decoders have no means of identifying ANY received signals! Why spend more money for other decoders with FEWER features? CODE-3 works on any IBM-compatible computer with MS-DOS with at least 640Kb of RAM, and a CGA monitor. CODE-3 includes software, a complete audio to digital PSK converter with built-in 115V ac power supply, and a RS-232 cable, ready to use. CODE-3 is the most sophisticated decoder available for ANY amount of money.

26 Modes included in PROFESSIONAL package include:

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- Autotape - Mk's I and II
- DUP-ARQ Arctac
- Telexplex
- ASCII
- ARQ-9098
- SH-ARQ/ARQ-S
- SWED-ARQ-ARQ-SWE
- ARQ-E/ARQ1000 Duplex Variant
- ARQ-N-ARQ1000 Duplex Variant
- ARQ-E3-CC/RS19 Variant
- POL-ARQ 100 Baud Duplex ARQ
- TDM242/ARQ-M24-242
- TDM432/ARQ-M24
- FEC-A FEC100A/FEC101
- FEC-S + FEC1000 Simplex
- Sports info 300 baud ASCII
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databases which can combine your list of "All Heard" loggings in HF, VHF and ACARS with data from other programs such as DACARS. Your database will be of great use in analysis or in filing a position report.

This extremely sophisticated but user-friendly program requires a PC with MS Windows™ 3.xx, 95 or 98 with minimum of 15 megabytes disk space and 4 megs of RAM. You may download a demonstration version which, with registration of \$60 dollars, can be fully enabled. For full information, <http://fly.to/airnav> will take you to the AirNav homepage. Or, you may send \$60 to RegSoft.com, 6595G Roswell Road, Suite 732, Atlanta, GA 30328, and specify AirNav Tracking Software for Windows.

AR5000 software control

There are several good software control programs around. Most of these are designed to be capable of controlling several different manufacturer's receivers. aRFive is different in that it is dedicated solely to the AOR AR5000. It does not try to be all things to all receivers; it aims to do one receiver only, but to do it very well. Consequently, aRFive claims to be much faster than some other programs.

Because the AR5000 is already a fast receiver, the program takes advantage of the built-in facilities of the receiver, rather than



loading individual frequencies. aRFive is a full 32 bit multi-tasking multi-threaded application. This means that you can run other 32 bit programs at the same time or even connect with the internet and run aRFive.

The AR5000 is a very versatile and complex receiver which can require a lot of learning and consultation of the manual to get the best from it. aRFive is designed to reduce this need.

Go to <http://www.ar5.com> to try out the demonstration edition of aRFive and make your own judgment. Full details for making the \$35 purchase are included in the demo download.

Beta Testing Opportunities!

Did you ever wonder how someone gets to become a beta tester for new products? Well, I don't know either, but there's one avenue that has been recently opened to the public. The BetaSphere web site allows individuals to sign up for consideration to participate in by-invitation-only beta testing programs for companies such as Motorola, Intuit, Adobe Systems, Intel, 3Com, E-Stamp, and others.

BetaSphere will act as a clearinghouse to match up individuals and beta testing opportunities. "The need for motivated, targeted beta testers is enormous," according to Michael Shoppel, president of the BetaSphere. "Beta testing provides ... the detailed customer feedback they need to confirm how their products perform in real-world environments, from the perspective of real customers."

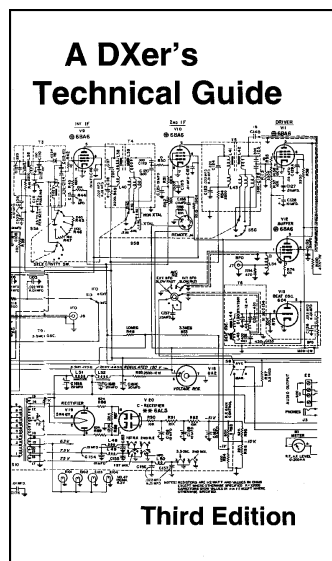
To sign up for consideration, go to <http://www.betasphere.com>

Catalog of Hidden Antennas

Hamco has released its 1999 catalog of hidden antennas for apartment or covenant-bound

shortwave and scanner listeners. Hamco's catalog of covert antennas includes verticals, dipoles, quads, yagis, J-poles and more. To get your copy of their catalog of high-performance, low-cost stealth antennas, send \$2 for shipping and handling to FEICK, Suite F239193, 3590 Roundbottom Rd., Cincinnati, OH 45244-3026.

A DXer's Technical Guide



For three publishing generations now, Nick Hall-Patch's excellent technical guide has served the hobby radio community with its insights and instructions, concentrating on receivers and accessories for the medium and shortwave spectrum.

Commencing with a look at the most popular desktop and portable radios of the present and recent past, and moving into filters, attenuators, and recorders, the volume quickly enters the realm of antennas, by far the most critical—and thus most expansive—section of the book.

Whips, loops, tuners and preselectors, Beverages, random wires, phasing units, grounds, noise reduction, static protection, and more are treated thoroughly, with many home-brew plans included.

Although some math is introduced for the advanced hobbyist,

there is enough "meat" in the text to appeal to beginners as well. A good overall look at the shortwave/mediumwave listening hobby.

\$12 postpaid from IRCA Publications, 9705 Mary Ave. NW, Seattle, WA 98117-2334. Add \$2.50 for overseas shipping.

RadioMap

John Wagner of Pickerington, Ohio, calls your attention to a product that has been offered in MT but you may have overlooked: Bob Parnass' RadioMaps. "Among the collection of very good receivers that I own and use every day is one of the newer 'wide banders.' When you use a rig like this you need antennas galore in order to experience all of the capabilities that this new rig has to offer. Really, the whole hobby is about antennas!

"What's that got to do with a radio map? I can think of no better way for me to really come to grips with 'How well are my antennas doing?' Unlike our amateur brethren, we can't get signal reports. The Radio Map is simply a map of all the FCC registered transmitters in the area of your choosing.

"Print size on the 11 x 17-inch map is adjusted for readability and it's plumb full of information by frequency number and transmitter location. Not only can I check how far my antennas are able to receive, I am now able to ID many RF sources that I (formerly) had no idea were there.

"Radio Map is one of the most useful pieces of information in my shack. How's your antenna doing? I know how mine are!"

Books and equipment for announcement or review should be sent to "What's New?" c/o Monitoring Times, P.O. Box 98, 7540 Hwy 64 West, Brasstown, NC 28902

Press releases may be faxed to 828-837-2216 or e-mailed to mteditor@grove-ent.com.

LETTERS TO THE EDITOR

NEWS AND VIEWS FROM OUR READERS

Rachel Baughn, Editor

Continued from page 3

Guilty as Charged

Roy PB, N9INO, responded to Larry Van Horn's guest editorial in the November *MT*.

"While I agree with your assessment of the situation I find that I, too have been guilty of both asking for frequency information and providing lists of unconfirmed veracity. I offer this defense: Usually if I am able to provide requested frequency information, I do. Although I've not personally confirmed many of these frequencies, they have been obtained from what I consider to be a reliable source...usually *MT* or *PopCom*. If I know where I got the information, I usually credit the source. If it's info which I've gathered over the years from various sources, I often don't.

"Secondly, it's usually done as a matter of expedience. Somebody's looking for the info in some sort of hurry or another, or I need the information quickly because I've just found out that I'll be travelling to an area and need the data ASAP.

"But regardless of the source, any frequency list is only a starting point in my eyes. Although lead times of magazines have dropped over the years, you know how quickly these lists go out of date. The internet is a source of rapid (and hopefully accurate) information. But it, too is only a starting point.

"I'm never the 'frequency pro.' I agree with you regarding not taking credit for someone else's work. That started way before the internet."

— 73 de N9INO.



Kevin Klein is a frequent contributor to the "Communications" column. Also shown above are Sarah and Patches Klein.

To the Moon with WINRADiO

Donald William Murden sent a note to the folks at Rosetta Laboratories, manufacturer of the WINRADiO, regarding the unit he had purchased from Grove Enterprises: "Extremely pleased with the 1500 E unit. This is being used to receive moon echo signals on 1.29 GHz. The spectrum analyzer is just fantastic."

Bob Grove explains that this interesting application is called moonbounce — a favorite pastime of some niche radio amateurs since just after World War II. They use Yagi arrays on either 144 or 420 MHz, pulse a burst of radio energy at the moon, then listen for its return about three seconds later.

Power does not equal Range

"The following comments are in regard to the article 'Kenwood's Easy-To-Use FreeTalk,' page 71, October 1998 *Monitoring Times*. I much enjoyed the article and found it informative and interesting. It was helpful to include the channel numbers and associated frequencies of the Family Radio Service, which might aptly be called the 'Fun Radio Service.' The generic FRS radio can be genuinely helpful as well as fun for just about anyone.

"The following statement from the article, however, is technically incorrect: 'Unfortunately, the range of the FreeTalk is only about 2/3 that of other top-of-the line FRS radios. The reason: the FreeTalk puts out only 330 milliwatts on transmit, compared to a full half watt for the other top performers.'

"Please note: radio range comparison cannot be directly correlated on a one unit of distance for one unit of power. If 'the range of the FreeTalk is in fact 2/3 that of other top-of-the line FRS radio,' it is not because the RF output is 2/3 that of other radios. The above can be verified by actual testing or perhaps most easily and graphically by any of several computer programs available to professional vendors and installers of VHF/UHF two-way radio equipment."

— John N.

Henning, via email

Kudos

"I would like to thank you for such an interesting and informative magazine. While the range of my listening is limited to international shortwave, in-the-clear utility, and aircraft transmissions, your magazine has really broadened my scope. I am continually discovering things that, three years ago, I never knew were possible with shortwave radio. (Most notable was being able to monitor Hurricane Georges as it hit the Gulf coast a few months ago.)"

—William Seamans, Pineville, LA

"Just a note to let you know what a fine job your company is doing for the SWL and ham. Just unpacked and installed my new Drake R8-B and couldn't be happier. The SP-200 attached to it makes it an ideal setup for me. Even during the day (now) this Drake is hearing so much more than the Sony ICF-2010, which I had been using. Both are superb radios and I believe I now have the best of both worlds. Your techs and phone-personnel are to be commended for their very professional approach. With the hardware setup and my subscription to *Monitoring Times*, things are nearly perfect here."

— David Baird Catlin, Illinois

"For a long time I have been wanting to write and tell you folks how much I enjoy *MT* and look forward to receiving each issue. *MT* has more meat and spuds and not much in puff pieces. I am not a ham or into the technical aspects of radio, but I do enjoy DXing with my Drake R8 and Sony SW7600 and scanning with my AR2500 and PRO34. Your magazine has been a very great help to me in my hobby.

"Last May we traveled to Albany, NY; while there I set up the SW7600 with its reel antenna and thanks to Hauser's Highlights, I picked up a broadcast by Iceland Radio. I don't write for verification cards, but I just might for that special find!

"I am 57 years old and had to retire early because of ill health, and have enjoyed many hours DXing, scanning and reading *MT*. Please keep up the good work you and the staff do. Someone might look into writing a piece on the USAF's Survival School at Fairchild AFB near Spokane, Washington. They have exercises every June and this year it was very

Letters, continued on page 102

STOCK EXCHANGE

Monitoring Times assumes no responsibility for misrepresented merchandise.

Ads for **Stock Exchange** must be received 45 days prior to publication date. All ads must be paid in advance to *Monitoring Times*.
Ad copy must be typed for legibility.

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Continued from page 101

realistic as a chopper went down and they had to rescue the crew!"

— *Bill Hochstatter, Colfax, WA*

"A note to say (1) I found and purchased a mint-condition Satellit-700 for \$260 due to the ad I ran in *MT*. (2) Your new catalog is beautiful and it's nice to see it separate again. It's really classy. (3) The Nov *MT* arrived today and it is also really nice. You continue to do quality work ... and survive."

— *Tom Hammett, via email*

Thanks for your votes of support, which

you cast by way of renewing your subscriptions and by telling your friends about *Monitoring Times*! With your help, we hope not only to survive, but to thrive! Note, for example, the upgrade in paper quality this month, made possible by a switch to a different printing company. As always, there will likely be a few bugs to sort out, but we hope the new association will result in an even higher quality magazine and improved delivery.

Your letters and comments are welcome to Rachel Baughn, Editor, PO Box 98, Brasstown, NC 28902 or mteditor@grove-ent.com

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By Bob Grove,
Publisher

Bits and Pieces

■ Ridiculous Regulation

One of the most mysterious regulations of the Federal Communications Commission (FCC) is the requirement that a radio used in one service (say, amateur) cannot be used concurrently in another service (say, business or public safety). Even if the specifications meet the technical requirements of each of those services, you cannot legally switch channels from one service to another — you must use another radio!

A case in point: I am a licensed ham, also Experimental/Developmental, and I am issued authorization in the public safety as a volunteer firefighter. Why can't I use my Icom transceiver legitimately for all three services? As it stands, I must have three separate radios to be legal.

Suspicious that the prime mover in this irrational regulation might be the radio manufacturers themselves who would profit from selling me three radios when I only needed one, I contacted the FCC to resolve this curious dilemma. The answer was entirely unexpected.

The rulemaking was made in an effort to discourage improper use of radio and to prevent interference from non-licensees. For much the same reason, companies are not allowed to manufacture amateur equipment (linear amplifiers or 10 meter transceivers) that is also capable of operation on Citizens Band (CB).

When I countered this argument by saying that the potential for "improper or unauthorized use" has not resulted in such severe restrictions on cars, guns, alcohol, etc., the spokesman agreed, but added that while there are police on the road for those infractions, the seriously overworked and underfunded FCC doesn't have such enforcement capability.

But it appears that this perspective on interoperable radios might be changing soon. A high priority is the consideration to permit manufacturers to develop common-platform radios which can be used in a variety of services but can be software controlled to make the correct choice.

There are three proposals presently under study: (1) "smart" radios which sense adjacent-channel congestion, changing bandwidth as necessary; (2) software-controlled radios which permanently restrict frequency ranges at the time of production; and (3) wideband radios with vendor software which allows frequencies to be allotted based upon the client's license authorization. The latter would be most valuable, since it would accommodate expanded licensing privileges by the owner and maintain used equipment value at resale.

This all makes good sense; it will save manufacturing costs by allowing one common transceiver platform for interoperability, and it will provide savings for the consumer who can use one radio instead of needing two or more. Let's hope the Commission follows through on this enlightened course.

■ Worse than Y2K?

While irrational, excitable, and uninformed folk the world over are stocking up for computer Armageddon, a much more likely threat looms a couple of months sooner: the Leonid meteor swarm. November 1999 portends to be the most potentially damaging storm in more than three decades, since the beginning of the space age.

Millions of meteoroid fragments will rain on the Clarke Belt, threatening to wreak devastation on satellites providing vital communications, TV, weather, military, scientific, and amateur radio links. Massive disruptions in commerce, banking, telephone service, defense, national security, electronic entertainment, weather forecasting, and many other services are inevitable if these vulnerable orbiting platforms are hit.

While vast resources are being expended on the hype of the new millennium, not a penny appears to have been allocated toward alternative communications should these rocky fragments hit home. Last November's sparkling spectacle was a preview of coming attractions. They are on their way here, they will hit Earth's atmosphere, and we aren't prepared.

Of course, meteor swarms are unpredictable; the spate of sparks may prove to be just another pretty meteor storm, "full of sound and fury, yet signifying nothing." But can we afford to ignore the alternative prospect?

■ The Rebound Effect

No one can deny that the radio hobby has suffered considerable reduction in its ranks over the last few years. The home computer and the Internet vie for the attention of the intellectually curious, and for the consumer dollar as well. The "Gee whiz" factor is gone from electronics in this plug-and-play age, and you don't need to learn the Morse code or take a test to enjoy worldwide communications from the comfort of your keyboard. Satellites deliver considerably more entertainment, and without static.

Radio magazine subscriptions and software databases suffer as well with such a vast amount of free, current information available on the Net, and there's only so many hours in the day to read and absorb the copious copy.

For hobby listeners, more and more communications are being scrambled, and new laws coupled with bad press have a chilling effect on newcomers and old timers alike.

But the hemorrhaging seems to have abated somewhat; while sales are not brisk, the drop seems to have levelled off. Even with the slow economy, hobby radio is not that far behind big business.

Perhaps two effects are at work here: Converts from radio to computers are rediscovering their roots, and individuals who teethered on computers are looking for other electronic gratification, discovering radio. It's too early to tell, but this year could reflect a turnaround in radio. Let's wait and see. We'll be here. Will you?

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